Fear of falling and associated activity restriction in older adults: An exploration of anxiety, coping style and beliefs about health and ageing

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Declaration

I declare that the work contained in this thesis is all my own.

Caroline Burdon-Cooper

Date: 7th November 2003

Contents

FEAR OF FALLING AND ASSOCIATED ACTIVITY RESTRICTION IN OLDER ADULTS: AN EXPLORATION OF ANXIETY, COPING STYLE AND BELIEFS ABOUT HEALTH AND AGEING ..... **I**

CONTENTS ..... **II**

TABLE OF TABLES ..... **VI**

ACKNOWLEDGEMENTS ..... **VII**

ABSTRACT ..... **VIII**

1 INTRODUCTION **1**

1.1 CHANGING DEMOGRAPHICS- WORLD WIDE, NATIONALLY, LOCALLY 3

1.2 CONCEPTS AND THEORIES OF AGEING 6

1.2.1 Disengagement theory *6*

1.2.2 Activity and continuity theories *6*

1.2.3 Active ageing *7*

1.2.4 Successful ageing *8*

1.2.5 Selective optimisation with compensation *8*

1.2.6 Identity in life span and ageing research *9*

1.2.7 Multiple thresholds model *11*

1.2.8 Summary *12*

1.3 PHYSICAL CHANGES AND AGEING 14

1.3.1 'Normal' physical ageing- loss of functional abilities *15*

1.3.2 Physical illness in later life –prevalence *17*

1.3.3 Excess disability *18*

1.4 FALLS IN OLDER PEOPLE- PREVALENCE 19

1.4.1 Causes and risk factors *19*

1.4.2 Physical consequences of falls *20*

1.4.3 Activity restriction *21*

1.4.4 Psychological consequences of falls *22*
1.4.5 Fear of falling or the post-fall syndrome *22*
1.4.6 Interventions and treatment *24*
1.4.7 Summary *26*
1.5 DEPRESSION IN LATER LIFE 27
1.5.1 Mood disorders in medical patients *28*
1.5.2 Morale, attitudes to ageing, effect on mortality *28*
1.6 ANXIETY IN LATER LIFE 30
1.6.1 Prevalence *30*
1.6.2 Problems with measurement *31*
1.7 STRESS AND COPING 32
1.7.1 Coping in response to appraisal *33*
1.7.2 Coping in older adults *34*
1.7.3 Coping and illness *35*
1.7.4 Coping and anxiety *36*
1.8 HEALTH BELIEF MODELS 37
1.9 SUMMARY OF THE INTRODUCTION 38

2 RESEARCH AIMS 40

2.1 RESEARCH QUESTION 40

3 HYPOTHESES 41

3.1 COMPARISON OF FALLS SYNDROME CONCEPTUALISATIONS 41
3.2 EFFECTS OF BELIEFS ABOUT HEALTH STATUS 41
3.3 EFFECTS OF COPING STYLES 41

4 METHODOLOGY 42

4.1 PARTICIPANTS AND RECRUITMENT 42
4.2 ETHICAL CONSIDERATIONS 44
4.3 MEASURES 45
4.3.1 Beck Anxiety Inventory (BAI; Beck et al. 1998) *45*
4.3.2 Penn State Worry Questionnaire (PSWQ, Meyer et al. 1990) *45*
4.3.3 Weekly Activity Diary. *46*

4.3.4 Geriatric Depression Scale, (GDS -15; Sheikh et al. 1983) 46
4.3.5 Attitude Toward Own Ageing (PGMS; Lawton, 1975) 46
4.3.6 Falls Efficacy Scale, (FES; Tinetti et al. 1990) 47
4.3.7 Activities-Specific Balance Confidence Scale (Powell et al. 1995) ... 47
4.3.8 COPE, (Carver, Scheier, Weintraub, 1989) 47
4.4 STRUCTURED INTERVIEW 49
4.5 FUNCTIONAL ASSESSMENT 50
4.6 RESOURCES 50
4.7 DATA HANDLING AND ANALYSIS 50
4.7.1 Power 50
4.7.2 Data handling 50
4.7.3 Normality 51
4.7.4 Transformation 52
4.8 CONSIDERATION OF REDUNDANT VARIABLES 53
4.8.1 Measures of anxiety 53
4.8.2 Measures of falls confidence 53
4.8.3 Measures of physical ability 54
4.8.4 Measures of activity 54
5 RESULTS 55
5.1 SAMPLE CHARACTERISTICS 55
5.1.1 Medical characteristics 55
5.1.2 Anxiety and worry and depression 56
5.1.3 Data obtained from the structured interview regarding falls 58
5.1.4 Falls Confidence 59
5.1.5 Health beliefs and ageing morale 59
5.1.6 Coping 60
5.2 STATISTICAL ANALYSIS OF HYPOTHESES 61
5.3 AIM ONE 62
5.3.1 Hypothesis 1 62
5.3.2 Hypothesis 2: 63
5.3.3 Hypothesis 3: 64

5.3.4 Summary *65*

5.4 AIM TWO 66

5.4.1 Hypothesis 4 ..... *66*

5.4.2 Hypothesis 5 ..... *67*

5.4.3 Hypothesis 6 ..... *71*

5.4.4 Hypothesis 7 ..... *72*

5.4.5 Summary *73*

5.5 AIM THREE 74

5.5.1 Hypothesis 8 ..... *74*

6 DISCUSSION 77

6.1 THE SAMPLE 77

6.1.1 Gender *77*

6.1.2 Age balance *78*

6.1.3 Anxiety, worry and depression in the sample *78*

6.2 SUMMARY OF FINDINGS: HYPOTHESES FROM AIM ONE 80

6.3 SUMMARY OF FINDINGS: HYPOTHESES FROM AIM TWO 82

6.3.1 Attitude to ageing *82*

6.3.2 Health beliefs *83*

6.3.3 Appraisals of falls and fear of falling *84*

6.4 SUMMARY OF FINDINGS: COPING AND FALLS 86

6.5 DISCUSSION OF METHODOLOGICAL LIMITATIONS 88

6.5.1 Design *88*

6.5.2 Measures *89*

6.6 CLINICAL IMPLICATIONS OF THE CURRENT STUDY 91

6.7 FUTURE RESEARCH 91

7 REFERENCES 92

8 APPENDICES 111

8.1 PATIENT AND GP INFORMATION 112

8.2 MEASURES 113

Table of Tables

TABLE 1 MEAN SCORES ON MEASURES OF ANXIETY DEPRESSION AND WORRY 56
TABLE 2 CORRELATIONS BETWEEN MEASURES OF ANXIETY, WORRY, DEPRESSION, FALLS CONFIDENCE, ACTIVITY AND PHYSICAL ABILITY (PEARSON'S *R*, 1-TAILED)..... 57
TABLE 3 MEAN SCORES ON MEASURES OF FALLS CONFIDENCE, ACTIVITY AND PHYSICAL MOBILITY 59
TABLE 4 LIKERT SCALE SCORES INDICATING STRENGTH OF BELIEF IN SIX STATEMENTS. SCORES ABOVE 3.5 INDICATE AGREEMENT. 59
TABLE 5 MEAN VALUES ON COPING SCALE 60
TABLE 6 INDEPENDENT T -TESTS OF AFRAID VERSUS NOT AFRAID (1-TAILED). 62
TABLE 7 INDEPENDENT *T* TESTS OF FALLS CONFIDENCE (1-TAILED) 63
TABLE 8 INDEPENDEDENT *T* TESTS OF DIFFERENCES BETWEEN ANXIOUS AND NON-ANXIOUS PARTICIPANTS (2-TAILED) 64
TABLE 9 CORRELATIONS BETWEEN AGEING MORALE SCORE AND EXPERIMENTAL VARIABLES (1-TAILED) 66
TABLE 10 PEARSON'S *R* CORRELATIONS BETWEEN HEALTH BELIEFS, NUMBERED 1-6. 67
TABLE 11 PEARSON'S *R* CORRELATIONS BETWEEN MEASURES OF ANXIETY, WORRY, DEPRESSION, FALLS CONFIDENCE, ACTIVITY, PHYSICAL ABILITY, ATTITUDE TO AGEING AND STRENGTH OF HEALTH BELIEFS (1-TAILED) 68
TABLE 12 MEAN SCORES IN THOSE WITH LOW LEVELS OF ACTIVITY COMPARED WITH THOSE WITH HIGHER LEVELS OF ACTIVITY (2-TAILED). 69
TABLE 13 MEAN SCORES IN THOSE WITH LOW LEVELS OF FALLS CONFIDENCE COMPARED WITH THOSE WITH HIGHER LEVELS OF FALLS CONFIDENCE (2-TAILED). 70
TABLE 14 INDEPENDEDENT *T* TESTS OF MEAN DIFFERENCES BETWEEN PEOPLE WHO KNEW WHY THEY HAD FALLEN AND THOSE WHO DID NOT (1-TAILED). 71
TABLE 15 INDEPENDEDENT *T* TESTS OF MEAN DIFFERENCES BETWEEN PEOPLE WHO REPORTED THEIR FALLS AS UNAVOIDABLE AND THOSE WHO DID NOT (2-TAILED)..... 72
TABLE 16 INDEPENDEDENT *T* TESTS OF MEAN DIFFERENCES IN USE OF PROBLEM-FOCUSED COPING BETWEEN ANXIOUS AND NON ANXIOUS, LOW FALLS CONFIDENCE AND HIGH FALLS CONFIDENCE, AND LOW AND HIGH ACTIVITY PARTICIPANTS(1-TAILED). 74
TABLE 17 PEARSON'S R CORRELATIONS BETWEEN COPING STYLES, ANXIETY, FALLS CONFIDENCE AND ACTIVITY (1-TAILED) 75

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Abstract

Research into the prediction of falls in elderly people has demonstrated the significance of psychological factors, which are assumed to contribute to a falls related syndrome. This syndrome consists of avoidance of activity, loss of confidence in movement, and the acknowledgement of fear or concern about future falls. This can result in considerable 'excess disability' in the form of increased susceptibility to anxiety and depression, and the likelihood of further physical decline through inactivity.

This study examined the relationship between fear of falling, associated activity restriction and a number of psychological variables such as anxiety, coping style and health beliefs in a sample of older adults who were attending falls prevention clinics.

The aims of the study were to explore alternative conceptualisations of the fear of falling syndrome, to investigate the impact of health misconceptions and negative views of ageing, and to examine coping in this group.

Conditional upon receiving informed consent, 30 participants were interviewed during their attendance at two geriatric day hospitals. Information was gathered from participants using a structured interview and measures of anxiety, coping, depression, worry, ageing morale and falls confidence. Information on physical mobility and medical comorbidity was gathered with consent from patients' medical notes.

Results highlighted the presence of considerable levels of depression and anxiety within the sample. Association was demonstrated between beliefs about uncontrollable age –related decline and levels of activity restriction in the sample. Less anxious fallers displayed greater use of problem-focused coping strategies than did anxious fallers.

1 Introduction

This thesis is about people who fall and hurt themselves. Specifically, about older people who fall, and the consequences and risks for them of that experience. Although having falls is something that happens reasonably frequently throughout our life times, as people age, the nature and implications of falls alter considerably. As we age, having a fall becomes a much more significant event, one that is often associated with serious physical and functional consequences. This thesis aims to further explore questions raised in the literature on falls about the importance and role of psychological factors, specifically the concept known as fear of falling. Additional aims are to determine which coping strategies are used by people who have fallen and to explore links between activity levels, anxiety and health beliefs. The clinical implication of this research is that it is likely that these factors have an influence on peoples' physical and mental recovery after a fall, their uptake and use of rehabilitative interventions and the degree to which they are able to prevent future falls.

In order to provide background and a clear articulation of the hypotheses to be tested, the introduction will contain a review of literature concerning a number of relevant areas. Firstly the change in demographics will be reviewed; with an increasingly ageing population, there is an increased urge to focus on problems associated with old age, both for economic and quality of life reasons. Secondly, the topic of theory of ageing is discussed. Gerontology is a relatively new field of research, characterized by advances in knowledge in numerous disciplinary spheres, but with little overall cohesion of ideas and theory. However, it will be argued that in this complex field, the attempt to find integrated theories is vital for discovering explanations for a number of problems associated with ageing, and hence for determining and evaluating interventions. Thirdly, physical changes associated with ageing are reviewed, along with the chronic physical health problems that people are increasingly likely to suffer from as they age. Many of these physical changes and illness have a direct influence on the etiology of falls. Fourthly, the topics of falls and fear of falling are discussed. Following on from fear of falling, anxiety in later life is

reviewed, along with depression and the association between mental and physical health problems in old age. Lastly, theories of stress and coping are discussed with reference to the literature on models of health behaviour.

1.1 Changing demographics- world wide, nationally, locally

The last century has seen a dramatic rise both in world population size and life expectancy, largely due to improvements in health care affecting child survival rates and survival from communicable diseases. In the majority of the developed world, populations have stabilised, however the proportions of the population in the different age bands are changing. As people live longer, the proportion of the population in the older age groups is rapidly increasing.

As in other parts of the developed world, demographic changes in the population of Scotland result in a relative increase in the number of older people. The number of people aged 65 and over has more than trebled during the past century, and the upward trend is expected to continue for much of the next 30 years. Data from the 2001 census (www.statistics.gov.uk/census2001) show that there are now approximately 805,000 people aged 65 and over living in Scotland. 40 per cent of these are men and 60 per cent are women. In the next 30 years there will also be significant increases in the numbers of over-80s and over-90s. This will result in an increase in the proportion of those over 65 in the general population from 15.9 per cent to 18.4 per cent over the same period. (www.statistics.gov.uk/census2001). These proportions are similar in Edinburgh, the city from which the sample study is drawn.

An important question posed in the 1980's by Fries (1980) was: Would morbidity, disability and handicap be expanded by the increase in life span, or compressed? Fries (1980) argued optimistically in predicting 'compression of morbidity', on the grounds that ageing-dependent diseases could be delayed in their onset by lifestyle change and medical interventions. However, this relies on the degree to which the rate of ageing is linked to ageing–dependent diseases, many of which cause long-term disability rather than death. Evidence from the 1982 US National Long Term Care Survey has shown that substantial health improvements are being made, as evidenced by rates of disability among older adults in successive years. Actual

prevalence of disability among older adults in 1994 was significantly lower than the projected rates (Manton *et al.* 1997).

Some of this early optimism has diminished with the findings from studies such as the Berlin Ageing study (BASE) (Baltes & Mayer, 1999). These conclude that although the increase in longevity is accompanied by more healthy years of life, health span is not improving in proportion. As people get older the incidence and prevalence of ill-health increases. Life expectancy overall has increased by nearly 30 years over the past century, but life expectancy at age 65 has increased by only 4 years and the healthy lifespan has increased by only 2 years over the same period. Despite medical and social advances, an average life expectancy in men of nearly 73 years will include an average of 8 years in poor health. For women an average life expectancy of approximately 78 years will include an average of 11 years in poor health. Many women are more likely to be living their last years alone, with chronic health problems and financial stresses

A useful distinction when considering these optimistic versus pessimistic views of life and health span is that between the 'Third Age' (Laslett, 1991) and the 'Fourth Age' proposed by Baltes (2002). This is an elaboration of the 'young old' and 'old old' distinction introduced by Neugarten (1974). Both of these articulate the considerable differences between people ranging from 65 years old to approximately 85 years old and those aged 85 and above. Baltes (2002) suggests that the major improvements in human ageing are primarily for the people in the 'third age', that is, the young old. Research on the oldest old suggests that plasticity, potential for new learning, adaptation and reserve capacity are more limited for this group.

As the WHO policy document 'Active Ageing' (WHO, 2002) comments, increased longevity is a major societal achievement. However, it carries with it a major economic, social and medical challenge, if the years gained are to be quality years.

However, despite the cautionary findings discussed above, the adoption of good health habits, even late in life, has been shown to be associated not only with an increase in life span, but also in health span (Rowe & Kahn, 1998).

Factors related to lifestyle that influence the rate at which functional capacity reduces are beginning to be well known, due to increasing attempts to advertise their importance. They include: smoking, diet, alcohol consumption and level of physical activity.

A healthy lifestyle, with regular physical activity, avoiding smoking and a healthy diet, is important throughout life. The Scottish Health Survey 1998 (2000) suggests that smoking rates are substantially lower in those aged 65 to 74 years, compared with younger age groups. Eating fresh fruit and vegetables is also higher in those aged 65 to 74 years. However, inactivity is increasingly common as people get older. Half of the women aged 64 to 75 undertake no moderate activity, and just under half of the men in this age group are also inactive. The current recommended activity level for adults is at least 30 minutes of moderate activity on 5 or more days per week. Only 14 per cent of men and 8 per cent of women aged 65 to 74 in Scotland achieve this (Scottish Health Survey, 2000).

Smoking cessation and relatively small increases in the level of physical activity reduce the risk of developing coronary heart disease in later life. There is substantial evidence that lost fitness can be regained with regular physical activity, even in extreme old age.

Given that 72 per cent of the cost of lifetime care is incurred in the last 10 years of life, even small amounts of investment in this area are likely to be of substantial benefit both to individuals and to society.

1.2 Concepts and theories of ageing

Given that this thesis is about falls, a problem associated with ageing, it is necessary to consider what is meant by the term and the processes it signifies. Concepts and ideas concerning ageing can be loosely divided into concepts about ageing, that is collections of predictions and knowledge about what the ageing process might involve, and theories of ageing, which attempt to explain the process.

In conjunction with the shift in demographics and altered expectations about health and life span, there has been considerable shift in how old age is perceived, that is, in concepts about ageing. Ageing has been viewed as a process of inevitable decline and loss; more recent concepts of ageing are much more positively focused.

1.2.1 Disengagement theory

Disengagement theory, (Cumming, 1975; Cumming & Henry, 1961) was consistent with the view of old age as a period of decline and loss. Researchers from the Kansas City Studies of Adult Life, carried out in the 1950's, observed that people became increasingly internally focused and seemed to lose interest in the outside world as they grew older. They also observed that their sample occupied fewer roles and spent less time with other people as they aged. From these observations, it was concluded that disengagement was both the 'right way' and the 'normal' way to age. Sugarman (2001) observes that theories such as this lend legitimacy to social policies that maintain exclusion of older people from society. Disengagement theory was rightly criticised; it did not consider evidence that disengagement may not be intrinsic, inevitable or deliberate (Hochschild, 1975; Rose & Peterson, 1965), nor the proposition that it might not be desirable or healthy (Sugarman, 2001).

1.2.2 Activity and continuity theories

Diametrically opposite to disengagement theory, activity theory (Havighurst, 1963; Havighurst, Neugarten & Tobin, 1968) proposed that optimum satisfaction with life in old age is achieved when people have maintained the relationships, activities and

roles they gained in middle age. This theory was criticised for its unrealistic assumption that maintaining this sort of level is feasible, as it makes no allowance for biological age-related changes (Bond *et al.* 1993). Both theories seem to have taken a rather extreme and prescriptive view of what optimum ageing should comprise; neither considered the meaning and implications for individuals of reduction or maintenance of roles and social networks. However, a third explanation of successful ageing, termed continuity, (Neugarten, 1968; Atchley, 1989) highlights the significance of individual experience and life course in determining levels of satisfaction in old age. From this perspective, optimal ageing consists of the ability to maintain both valued external roles and activities, and an inner sense of identity and selfhood. Current concepts of ageing have maintained this appreciation of individual heterogeneity, loss, gain and change.

1.2.3 Active ageing

The World Health Organisation adopted the term "active ageing" in the late 1990s over the term "healthy ageing" in recognition that there are many factors in addition to health care influencing how people age (Kalachea & Kickbush, 1997). Active ageing is seen as the process of optimising quality of life in the ageing population, by improving and maximising opportunities for health, participation in society and security. The policy document 'Active Ageing' (WHO, 2002) highlights these issues, because of recognition that the changes in the demographics of ageing will put increased economic and social demands on all countries. It also acknowledges that older people provide a valuable, under-utilised resource of skills, which makes an important contribution to the socio-economic fabric of our lives. The report calls for examination of practises and policies at all levels, so that the focus is on 'enablement' not 'disablement' of older people. Active ageing calls for the enablement of continued participation by older people in social, political, economic, cultural, spiritual and civic affairs.

1.2.4 Successful ageing

'Successful ageing' has been a popular term for more positive concepts on ageing for several decades. More recently it has been promoted as a guiding theme in gerontological research and as a challenge for the design of social policy (Rowe & Kahn, 1987). The concept suggests a vigorous examination of what successful ageing might be, how it may be defined and promoted, using a multicriteria approach. Baltes' (1990) concept of successful ageing contains the theory of ageing termed 'selective optimisation with compensation (SOC)', a model of adaptation consistent with seven propositions. Firstly it was stated that there is a big difference between normal and optimal pathological ageing. Secondly, there is much heterogeneity and variability in the course of ageing. Thirdly, there is much plasticity and 'latent reserve': the potential for new learning or adaptation under favourable conditions. Fourthly, this reserve is limited: even under optimal conditions older adults can't match the performance of younger adults. Fifthly, it is recognised that knowledge can pragmatically offset age-related cognitive decline. Sixthly, the balance between gains and losses becomes more negative with age, due to loss of adaptivity, plasticity and expectations. The seventh proposition is that the self remains remarkably resilient. Baltes (1990) suggests that selective optimisation with compensation can serve both as an explanation for how individuals achieve successful ageing in the context of biological vulnerability and reduced reserve capacity, and as a strategy for promoting effective ageing.

1.2.5 Selective optimisation with compensation

The model of selective optimisation with ompensation is proposed as the main strategy of how individuals orchestrate adaptive development across the life span (Baltes, 1999), using these three fundamental mechanisms. It is a flexible theory; the definitions of selection, optimisation and compensation may differ according to domain of functioning, or by theoretical framework, and it may be applied to a large range of domains. Each concept may be defined as passive or active, internal or external, conscious or unconscious. (Marsiske *et al.* 1995). Baltes and Freund (in press) propose that within an action-theoretical framework, selection involves

directionality, goals or outcomes, optimisation involves the means to achieve those goals, and compensation denotes a response to loss in means or resources to achieve or maintain the desired level of functioning. Baltes (2002) argues that in later life, selection and especially compensation become increasingly important to maintaining adequate levels of functioning. Baltes (2002) maintains that the exercise of selection and optimisation with compensation explains how very successful extremely old people maintain valued functions, and that it can also act as a blueprint for designing treatment interventions.

It is important to consider what an individual considers to be a gain or a loss: the nature of these may change with age, and is likely to be highly individual. It is also likely that as old age is approached, there are changes to the allocation of resources: more resources are directed towards maintenance or management of loss than towards functions associated with growth.

1.2.6 Identity in life span and ageing research

The construct of identity or self has been used in the area of adult development to refer to the individual's sense of self over time. It is conceptualised as incorporating various content areas, including cognition, social functioning, experiences in the world, and, of particular relevance to this thesis, physical functioning. All of these domains therefore have the power to influence sense of identity; changes in these domains may challenge a stable sense of identity. As the experience of falling may impact on many of these domains, particularly physical functioning, it is necessary to consider the concept of identity and how it may be maintained and developed in the process of ageing.

In the work of Brandstadter and Greve, (1994), Whitbourne (1986; 1996b), Markus and Herzog (1991), it is argued that the perspective of the self-system or identity, brings a useful organisation and comprehensive understanding of the dynamics of successful ageing and of adaptation despite loss and decline. From this perspective, identity is theorised to form an organising schema through which the individual's experiences are interpreted.

Experiences are proposed to relate to identity through the Piagetian concepts or processes of assimilation and accommodation. Assimilation is defined as the interpretation of life events in terms of the cognitive and affective schemas held by an individual (Whitbourne, 1996b); events hold different meanings for people depending on their views about themselves, the world and other people. Via assimilation, the interpretations of life events are incorporated into existing cognitive structures. In contrast, the process of accommodation involves changing one's identity, or cognitive and affective schemas in response to experiences. Thus an event that reflects unfavourably on identity, or which conflicts with schemas, is likely to be processed first through assimilation and, after such efforts prove unsatisfactory, by accommodation. It is theorised that a healthy state of emotional adaptation involves a balance between the two processes, in order that the individual can both maintain consistency over time and change when there are large discrepancies between experiences and expectations.

However, identity is more than just a reflection or representation of previous experiences, it is the result of a selective, creative process. As noted by Schaffer (1992), experience is not just encountered or observed, experience is made. Identity is therefore expressed and maintained by behaviour, and behaviour is influenced by identity.

Identity includes a time dimension, consisting of 'past selves', 'current selves' and 'possible selves'. Possible selves can provide positive and negative visions of the self in the future, and thus serve to organise and energise actions. Activities may be chosen to promote a desirable possible self, or to avoid an undesirable possible self. Past selves may provide a basis for personal history and a sense of both development and continuity over time. However they can also be a basis for negative comparison with current abilities and past abilities.

Age differences have been demonstrated for past and possible selves: older persons tend to hold more past selves than younger people, and fewer possible selves (Cross & Markus, 1991). It has also been found that the number of different self-schemas or

current selves held by older adults relates to their subjective level of well-being, in terms of depressive symptoms and self-esteem (Adelmann, 1994).

The implications of this for the current study are that both current and possible selves are under threat following a fall; if a current or possible self is a negative vision of dependence and disability, this is likely to affect both mood and behaviour. There is evidence from a study of fallers in Hong Kong that many fallers have precisely these fears (Kong *et al.* 2002).

1.2.7 Multiple thresholds model

Although life provides constant challenges to our identities over time, at the latter end of the life span there are multiple changes including losses to contend with; notably changes associated with declines in physical functioning. Whitbourne (1996) suggests a model of adaptation to ageing termed the 'Multiple threshold model'. Thresholds are points at which an individual recognizes an age-related change or loss of function. It is proposed that there are many thresholds, to reflect that ageing affects every system in the body. An individual may feel 'old' in one domain such as mobility, but feel 'young' or 'middle-aged' in other domains such as sensory acuity, social or intellectual functioning. Whitbourne comments that people vary widely in the areas of functioning that they value; it is assumed that changes or losses in areas important to a person have the greatest potential to affect sense of identity, and hence affective state. At the crossing of a 'threshold', an individual may use assimilative or accommodative strategies, or both. Whitbourne (1996b) reports that individuals who use mainly identity assimilation tend to attribute age-related changes to transitory states of health. This form of denial may serve to protect the sense of self as being competent, but may also mean that the individual denies the need to take appropriate precautionary or preventative actions. On the other hand, those individuals who tend to rely solely on identity accommodation are more likely to conclude prematurely that they are 'over the hill', and thus fail to take preventative actions (Woodward & Wallston, 1987), or to maintain their participation in previously rewarding activities (Janelli, 1993). As a result they may become more susceptible to depression. (Parmalee *et al.* 1991).

Whitbourne (1996b) suggests that the loss of physical competency is a common trigger to the crossing of a threshold, presenting a significant threat to identity. Although there are dangers inherent in responding to this threat with over-assimilation or over-accommodation, a balanced approach involves taking precautions where necessary, attempting to preserve functions, and finding ways to compensate for losses. There may be emotional costs in the recognition of impending losses, but it is proposed that individuals who maintain a balanced approach can also maintain optimism and vigour (Labouvie-Vief *et al.* 1987).

Whitbourne (1996b) concludes that an individuals' adaptation to the ageing process can be optimised by considering the assimilative or accommodative functions of identity. This thesis proposes that these are necessary concepts for understanding the fear of falling syndrome, which may inform and guide treatment and rehabilitative approaches for people who have fallen.

1.2.8 Summary

Although there has been much research focused on empirical findings describing ageing and on empirical models, for example, at the cellular and molecular levels, much of this has not been interdisciplinary. There has been little attention devoted to attempting to integrate findings into theories that can understand and explain ageing. In a review of theory, or lack of, in gerontological research, Bengtson, Rice & Johnson (1999) suggest that this lack undermines the process of connecting findings to explanations, and hence the advancement of knowledge about ageing. They predict that without integrated theory even a vast collection of empirical generalizations will not enable us to answer the sort of questions gerontology needs to answer.

The subjects of this study, falls and fear of falling, also reflect this lack of coherent theoretical underpinning. Much of the research on falls has been carried out in the domain of medicine and physical therapy. Fear of falling is mentioned repeatedly as a relevant factor, however no consistent theoretical model has been proposed to account for it. Whilst this study attempts to use theories of anxiety, and theories of

health behaviour, these are not a substitute for a developmental theory of ageing incorporating biological, psychological and social processes. Such a theory may be impossible to achieve. However, a number of useful 'mini-theories' of ageing exist, and this thesis attempts to integrate these with the research aims and findings.

1.3 Physical changes and ageing

Ageing involves physiological changes that occur with much variability across individuals (William, 1984). Roth (1991) has suggested that the biological process of ageing can be grouped into two distinct categories: normal ageing associated with gradual progressive change in various organ systems, and ageing associated with disease. Commonly, the population of geriatric rehabilitation units falls into the latter of these. (Harris *et al.*1995). Although it is true that older individuals are at increased risk of developing chronic health problems such as arthritis, cancer, diabetes and cardiovascular disease, these are not considered to be 'normal' age-related changes. However there remains a perception widely held by the general population that such conditions are an inevitable part of ageing.

In fact, individuals age in their own unique ways, due to their life style choices and genetic inheritance. Even with the effects of genetic inheritance there is much an individual can do to reduce risks (Rowe & Kahn, 1998).

However, some have argued that this distinction between 'normal ageing' and 'pathological' or 'disease-related ageing' is not feasible, or indeed useful. Without returning to the view that ageing involves inevitable disease, decline and loss, Solomon (1999) raises two criticisms of this distinction. Firstly he reminds us that disease is often defined as 'an impairment of the normal state of the living body, or of any of its components that interrupts or modifies the performance of vital functions', by which, the normal manifestations of ageing could be defined as diseases. Secondly, he points out that the majority of diseases associated with 'pathological' ageing are only diagnosable when they are at an advanced stage. The underlying pathology may have been present for many years. Therefore there is no valid way of determining that someone is experiencing 'normal', that is, disease free ageing. Similarly, many age-related changes are pathological by degree of severity, not by presence or absence. Solomon (1999) proposes a new concept with definitions to match. He proposes 'fundamental ageing processes' to describe inevitable side effects of living, including biochemical and cell changes. These lead to

'manifestations of ageing' which are at a more clinical level, and which vary in their specific characteristics across individuals. Fundamental ageing processes sensitise the individual to clinically observable physical consequences. These are reviewed below.

1.3.1 'Normal' physical ageing- loss of functional abilities

There are many age-related changes which are likely to affect how a person sees themselves, and may contribute to someone feeling 'old', but that have little direct effect on physical function. However, a number of changes do affect functional abilities and as such, constitute risk factors for falls.

Firstly, body build changes with age. There is a gradual reduction in height, largely caused by compression and collapse of tissue in and between the vertebrae, due to loss of bone mineral content (Garn, 1975). Body weight increases from the 20's until the mid 50's and body fat tends to accumulate around the waist and hips. From the 50's onwards, total body weight declines. However, this is primarily due to a loss of lean body mass consisting of muscle and bone (Chien *et al.* (1975). Thus body shape also changes, with extremities becoming thinner, and girth becoming thicker.

There is a loss of approximately 10-20 per cent of muscle strength between the ages of 40 –70, with greater losses of 30-40 per cent from 70 –80 years old (McArdle *et al.* 1991). This appears to be due to atrophy of 'fast-twitch' fibers that are involved in the powerful contractions associated with strength. 'Slow-twitch' fibers involved in maintaining posture seem to remain constant over the adult years.

However, the observed declines in muscle strength are not completely accounted for by loss of muscle mass: research has yet to determine these. In addition, there are individual variations that can lead to important deviations from this pattern of decline, notably due to gender and the level of activity that an individual typically engages in. There is much evidence that exercise and activity have a strong influence on ageing body shape; athletes continue to maintain a muscular physique for as long as they continue training (Suominen *et al.* 1977). The message is basically, "Use it or lose it". Although there is little that can be done to stop the loss of muscle cells, there

is evidence that a regular program of exercise can compensate substantially by promoting increased strength and efficiency in the remaining fibres, even in people as old as 90 (Fiatrone *et al.* 1990).

Decreases in measures of bone strength are observed from the 20's through to the 90's, at the rate of 5-12 per cent per decade (McCalden *et al.* 1993). This is largely due to a decrease in bone mineral content, resulting in bones becoming increasingly porous. It is thought that bone mass decreases by 20 –30 per cent in women, and by 10-15 per cent in men (Mazess, 1982). In addition to normal ageing, and the presence of genetic factors, bone mineral loss is thought to be influenced by lifestyle factors. Factors such as levels of physical activity, smoking, alcohol use and diet can account for 50-60 per cent of the variance in bone mineral density (Krall & Dawson-Hughes, 1993).

The functioning of joints also changes with age, due to cellular changes, and cumulative effects of wear and tear. Diminished circulation contributes further to deterioration by limiting the reparative abilities of tissues. Changes in the structures that support movement have many pervasive effects on an individual's life, resulting in restrictions in levels of activity, and the presence of pain. These can have a significant effect on an individuals' sense of well-being (Hughes *et al.* 1993) and heighten susceptibility to falling.

The functioning of the cardiovascular system becomes less efficient with age, due to changes in the structure of the muscular walls of the heart and blood vessel walls, irrespective of distinct cardiovascular diseases such as atherosclerosis. However, although age-related changes in the heart and arteries reduce the amount of blood available to cells of the body, these changes are not particularly noticeable until an individual engages in aerobic exercise. The average 65 year old has 30-40 per cent of the aerobic capacity they had as a young adult (McArdle *et al.* 1991). The effects of cardiovascular changes are magnified by changes to the respiratory system. Pulmonary structures lose elasticity, decreasing the lungs' capacity and reducing the amount of oxygen taken in. Changes to both these systems may result in shortness of breath during activity and increased fatigue, symptoms that are likely to have a

significant effect on an individual's sense of well-being. These symptoms may also be viewed as indicators of more life-threatening underlying conditions and, as such, are highly anxiety provoking.

Changes in the Central Nervous System (CNS) also affect the likelihood of falls. Ageing of the CNS affects a variety of sensory, motor and cognitive capacities, including perception, fine motor coordination, and large muscle control. However, there is tremendous variation among individuals in the ways in which ageing affects CNS functions, due to plasticity, compensatory processes, and response to the stimulation provided by life-style choices.

Sensory functions change with age; vision and balance are of particular importance with reference to falls. Difficulties in depth perception and adaptation to dark conditions can heighten vulnerability to falls (Felson *et al.* 1989); visual loss can increase an individual's dependence on others by interfering with their ability to complete basic tasks of living such as driving, shopping and food preparation (Rudberg *et al.* 1993). Changes to the vestibular system involve losses occurring in the sensory structures as well as in neural pathways integrating sensory information. Reductions in the numbers of cerebellar cells also reduce the body's reflexive ability to adjust posture in response to changes in position (Teasdale *et al.* 1991). Unpleasant sensations such as increased vertigo and dizziness are experienced (Tinetti, Williams *et al.* 2000), which may increase the likelihood of accidental falls.

1.3.2 Physical illness in later life –prevalence

The report 'Adding life to years' (CMO, 2000) reports that older people are well most of the time. Many enjoy good and even excellent health well into their 70's or later. For the less fortunate, ill health may be carried over from middle age, and for others the common disorders of later life - such as arthritis, deafness, heart disease, and diabetes - can, alone or in combination, cause increasing problems as the years and decades pass. In later old age, increasing frailty can bring greater risk of accidents and greater vulnerability to the effects of minor infections.

Vascular disease accounts for a large proportion of disability and half of all deaths in later life. The prevalence of cardiovascular disorder is similar in men (23.6 per cent) and women (23.5 per cent) and increases with age in both sexes. The prevalence of ischaemic heart disease (IHD) increases steeply with age, from 7.2 per cent overall to 31.0 per cent at 65-74 in men and from 5.3 per cent to 20.9 per cent in women (Scottish Health Survey 1998, 2000) Neither shows significant regional variation within Scotland but both demonstrate a clear gradient with increasing deprivation.

Nearly 20,000 people living in Scotland today have been disabled by a stroke. Of these 80 per cent were aged over 65 at the time it happened. The risk is greatest in older people and stroke has become the main cause of neurological disability in Scotland. Strokes can result in sudden loss of function and independence, which can be devastating to the affected individual and also to their family and friends. The risk of a further stroke is very real and a sense of social isolation can develop.

To give an illustration of the impact of age-related changes to vision and joints, the NHS in Scotland performs approximately 17,000 cataract operations, 3,300 total hip replacements and 2,300 knee replacements on people aged 65 and over each year (CMO, 2001).

1.3.3 Excess disability

Older adults are at risk for excess disability, or impairment of function beyond that directly attributable to disease, when social and physical support is inadequate.

The concept of excess disability refers to the observation that many older patients, particularly those with Alzheimer's disease and other severe and persistent mental disorders, are more functionally impaired than would be expected according to the stage or severity of their disorder. Medical, psychosocial, and environmental factors all contribute to excess disability. For example, depression contributes to excess disability by hastening functional impairment in patients with Alzheimer's disease (Ritchie *et al.* 1998). The Fear of falling syndrome is arguably another example of excess disability.

1.4 Falls in older people- prevalence

Falls in the elderly present a major challenge to health services for both prevention and rehabilitation. The scale of the problem is significant. It is estimated by large population studies that 30 to 50 per cent of people over the age of 65 fall each year (Tinetti *et al.* 1988;). In people over 80, the prevalence increases to 40 per cent. (Campbell, 1990). It is quite likely that these figures are an underestimation, as it is commonly only falls that lead to injury or loss of function that are reported. Cummings *et al.* (1988) reported poor recall of past falls among community dwelling older adults. Other problems with estimating prevalence include the lack of a common definition of what constitutes a fall among researchers and the public; people use many terms to describe falls of varying cause and severity, for example, 'slip' 'trip' and 'stumble' (HEBS 2001).

1.4.1 Causes and risk factors

Falling is associated with multiple physical, social and psychological risk factors. Many physical risk factors are associated with ageing, including: poor muscle strength, impaired balance, (Thornby, 1995) joint mobility, visual difficulties and physical de-conditioning. Conditions such as osteoarthritis, osteoporosis, Parkinson's disease, postural hypotension, dizziness, stroke also increase the risk of falls. Of particular importance is the need to maintain dynamic balance and a safe gait. Many people develop unsafe ways of moving around their homes, for example 'furniture walking' in which their posture is likely to imbalanced. Environment is of importance; many falls occur as a result of a trip over a loose rug or another obstacle, perhaps in areas of the home with poor lighting (Rubenstein *et al.* 1988). It has been suggested that environmental causes are more commonly implicated in falls in the younger old, and intrinsic factors in the old old (Carter *et al.* 1997). Certain medications are known to increase falls risk, particularly benzodiazepine use (Nevitt *et al.* 1989). Benzodiazepines are still a commonly prescribed drug in the elderly, despite much research on the dangers of long term use, and side effects such as dizziness and confusion (Llorente *et al.* 2000) It is also possible that other medications can affect falls risk, for example tricyclic anti-depressants and anti-

hypertensives. One report suggests that risk of hip fracture is tripled by the use of tricyclic anti-depressants (Ray *et al.*1987). A review of studies in this area by Edelstein and Drozdick, (1999) concluded that there was no consensus on the falls risk of various classes of drugs, but commented that research is very lacking in this field. In general, pharmacotherapy in older adults is vastly under researched. The ageing body metabolises drugs more slowly and in slightly different ways than at a younger age, which often has the effect of decreasing the therapeutic window and increasing the likelihood of adverse side effects (Naranjo *et al.* 1995). Side effects such as decreased blood pressure may heighten falls risk. To complicate pharmacotherapy further, older adults are likely to be on large numbers of medications for different conditions and are therefore at increased risk of effects of polypharmacy.

1.4.2 Physical consequences of falls

Falls are the most common cause of accidental death at home among those aged 75 or more in Scotland (HASS, 1997) and account for a large percentage of hospital admissions. As well as the risk of death related to immediate complications of injuries sustained with a fall, there is a significant longer term effect; the mortality rate within a one year period following a fall was found to be four times greater than for a gender and age matched group of non fallers (Wild *et al.* 1981). In addition to deaths, falls are associated with considerable subsequent physical, psychological and social morbidity. The incidence of serious injuries such as fractures and head trauma sustained as a result of a fall is reported to be between six and eleven per cent (Nevitt *et al.* 1991; Tinetti, 1988). Hip fracture is one of the most common of the serious injuries that can result from falls; its incidence increases substantially with age. Prudham and Evans (1981) report that 1 out of 200 falls results in hip fracture in individuals between the ages of 65 – 69; in individuals over the age of 85, 1 out of 10 falls results in hip fracture. Approximately 55 per cent of falls result in soft tissue injury (Nevitt *et al.* 1991). Minor injuries, when compared to no injury, are more likely in individuals with slower reaction times and decreased grip strength. Serious injuries are more likely where falls involved loss of consciousness, and where lower

extremity weakness and decreased cognitive function are present (Nevitt *et al.* 1991). Both of these observations indicate that the likelihood of injury is related to an individual's ability to protect them self when they fall.

A fall can often mean an abrupt change in a person's functional ability. The short-term or permanent mobility status of a person can be severely threatened by injuries, and temporary periods of bed rest resulting from falls. Even small changes in daily activity can have significant effects on muscle strength, joint mobility and stamina, potentially leading to physical de-conditioning and muscle weakness. This can mean that a person is less able to withstand threats to their balance and is more likely to have future falls.

As falls are so common and so potentially disabling, fall prevention and fall risk management have become an increasingly urgent priority. The government paper 'Adding life to years' (2002) has a specific section on falls and fracture prevention, which makes the recommendations that people should be asked regularly about falls, and if they are having current falls, that they have access to multidisciplinary evaluation.

1.4.3 Activity restriction

After a fall, it is common that people lose confidence in their abilities to move safely. This can mean that they find it difficult to regain their former level of activity. People may also try to avoid further falls by deliberately reducing activities. Restricted physical and social activity following a fall has been reported by a number of studies (Kellogg International Work Group, 1987; Murphy *et al.* 2002; Vellas *et al.* 1987). This has been noted as a consequence of a fall, independent of the severity of injury, presence of prior falls, age, gender or health status (Kellog International Work Group, 1987). As has been described in previous sections, lowered activity levels are a major risk factor for a number of physiological conditions, and serve to increase risk of future falls via physical de-conditioning.

1.4.4 Psychological consequences of falls

As has been mentioned in section 1.2.6, a fall can potentially have a huge impact on both identity and a person's ability to maintain roles they see as important. It has been assumed that it is the fear of physical harm and functional incapacity that have most impact; these aspects have been rated by older people as potentially more damaging to quality of life than cancer or heart attack (Salkeld *et al.* 2000). Cross-cultural support for this comes from a study set in Hong Kong that explored people's concerns about the consequences of falls. These included powerlessness, loss of independence and having to be cared for by relatives or others (Kong *et al.* 2001). However, further exploration of the perceived consequences of falling suggests that fear of pain, fear that the fall is a sign of terminal decline and fear of social embarrassment are salient concerns for fallers and people who feel themselves to be at risk of falls (HEBS 2001; Yardley, 1998). There are also potentially emotional consequences for the carers of relatives who have fallen. A study of carers and people who were hospitalised following a fall highlighted that emotional consequences are not restricted to patients themselves: their carers experienced rising anxiety after their relatives' discharge from hospital (Liddle & Gilleard, 1995).

Activity restriction may also mean that an individual's social interaction is reduced and that they are no longer taking part in pleasured activities. This can leave them vulnerable to depression as well as decreased physical fitness (Lewinsohn, 1974a). Depression in turn is likely to further decrease energy and motivation to undertake activities. Successful and active ageing are therefore much more difficult to achieve under these conditions.

1.4.5 Fear of falling or the post-fall syndrome

Fear of falling has gained increasing recognition as a health problem in its own right since it was identified in the early eighties (Bhala *et al.* 1982; Murphy & Isaacs, 1982). This phenomenon was described as a 'self-imposed decline in activity and function not necessitated by physical disability or injuries' (Kellog International Work Group, 1987). Various definitions and methods of assessment have evolved.

One approach has been to simply ask people whether they were afraid of falling. This has been criticised, both because it does not capture the range of response, and because standards to make judgements such as this may vary among individuals. Additionally, this method of assessment is unable to distinguish between excessive fear and rational anticipation of future falls. It also does not answer the question of what aspects of falling are anticipated and feared. However, the single question approach has the advantage of being easily comprehended, hence it is suitable for use with people with mild cognitive impairment.

A second approach has been to operationalise fear of falling as low perceived fall related self-efficacy (Tinetti & Powell, 1990). Self-efficacy is a concept proposed by Bandura (1977) as part of a general theory of behavioural change. Bandura (1977) suggested that behaviour change is directly linked with the modification of beliefs and expectancies; distinguished by two important sets of beliefs: self-efficacy and outcome expectancy. Self-efficacy refers to an individuals' belief that he or she can perform or succeed at a particular task or behaviour; outcome expectancy refers to the belief that the behaviour will result in a valued outcome. Both outcome expectancy beliefs and efficacy beliefs have been demonstrated to be useful predictors of health related behaviours (Vidmar & Rubinson, 1994; Dzewaltowski *et al.* 1990). Tinetti and Powell (1990) developed the Falls Efficacy Scale (FES), a continuous scale that asks for ratings of confidence in avoiding a fall for a number of specific situations, for example, getting in and out of a chair. Myers *et al.* (1996) developed a similar scale, the Activities Specific Balance Confidence Scale, which also describes fear of falling in terms of lowered confidence or efficacy in specific situations. Efficacy-based measures of fear of falling focus on efficacy beliefs, but do not measure outcome expectancy beliefs about falling.

Efficacy measures have been shown to correlate with the single item measure of fear of falling and to predict decline in activities of daily living (Myers *et al.* 1996; Tinetti *et al.* 1994). However, such measures have an exclusively functional focus, and tend to sample the only the most common activities of daily living. While this is a reasonable strategy for the construction of a widely usable measure, it provides no way of measuring the relative importance of these activities for the individuals

concerned. In consideration of the importance of maintaining roles and identity for emotional well-being, as discussed in section 1.2.6, this is a significant deficit of these measures.

Fear of falling is known to be present in those who have had experience of a fall, but also in those who have not. Approximately 25-55 per cent of community living older persons report a fear of falling (Tinetti *et al.* 1994; Arfken *et al.* 1994); the prevalence is higher among women and is as high as 50 to 60 per cent in people with a previous fall history (Downton & Andrews, 1990; Vellas *et al.* 1997). Fear of falling is thought to contribute to a loss of independence through restriction of levels of activity (Bruce, 2002; Friedman, 2002). However, fear of falling may not invariably cause people to restrict activity, and not all people who report activity restriction acknowledge a fear of falling. A prospective study carried out by Friedman *et al.* (2002) explored the temporal relationship between the experience of falling, fear of falling, and the risk of further falls. Over 2000 participants were evaluated at baseline and 20 month follow-up. This study demonstrated, as expected, that the experience of falls at baseline predicted fear of falling at follow-up, and additionally that the presence of fear of falling at baseline was a predictor of falls at follow-up. In people who had fear of falling at baseline, subsequent falls were much more likely if they had limited their activities. This study provides evidence that falls, fear of falling and activity restriction, do not necessarily occur in a linear fashion and suggests that there is a more complex spiralling effect.

1.4.6 Interventions and treatment

In order to provide a context for clinical implications of this study, interventions and treatment for people who have fallen will be briefly reviewed.

In keeping with government health policies and agendas, (CMO, 2002) collaboration between the American and British Geriatrics Societies and the American Orthopaedic Association has resulted in evidence-based guidelines for the prevention of falls in older people. NHS Health Education Scotland (formerly known as HEBS)

is developing proposals for project work to evaluate the development of local services in line with these guidelines.

Much recent research has been devoted to determining what types of intervention are helpful. Most falls are multifactorial in origin, and there is now a clearer understanding of the risk factors involved. The more risk factors present, the greater the risk of falling (Tinetti, 1990). Therefore, a multidimensional approach is often recommended throughout the literature. There is now evidence from randomised controlled trials that these interventions can have a considerable impact on increasing fitness and activity levels and, to a lesser extent, produce a reduction in the number of falls people have (Buchner *et al.* 1997; Ory *et al.* 1993; Tennstedt *et al.* 1998). Falls programmes, run from geriatric day hospitals, are now reasonably common in Scotland.

Multifactorial intervention usually consists of physical therapy to promote improvement of muscle strength, balance and gait. Secondly, medical management includes amelioration of risk factors such as hypotension, and polypharmacy. Advice may also be given on footwear and the use of mobility aids such as walking sticks and delta frames. Assessment of the home environment may be carried out by occupational therapists, to minimise environmental risks, such as loose wires and carpets, low chairs and washing equipment et cetera. Education may be given on how best to move from sitting to standing and vice versa, how to transfer safely when washing, and how to avoid compromising one's balance during activities of daily living such as reaching. People may also be taught how to get themselves up again were they to have had a fall in their home.

Surprisingly, few studies have attempted to target fear of falling, despite consistently acknowledging it as a risk factor for both current disability and risk of future falls. Tennstedt *et al.* (1998) undertook a controlled trial of a cognitive-behavioural group intervention aimed at reducing fear of falling and associated activity restriction. Compared with control subjects, the intervention group showed modest improvements post treatment in both fear of falling and activity levels, with diminished but discernible benefits at 12 months post-treatment.

However, interventions for fallers remain dominated by a medical- physical-occupational approach with little direct attention given to psychological factors. The guidelines provided by the American and British Geriatric societies do not make any recommendations about enquiring about fear of falling, or for undertaking assessment of other psychological factors such as anxiety or depression.

1.4.7 Summary

Although psychological factors are frequently commented on in association with falls and their consequences, there remains little consensus on how these manifest, or on how they should best be treated. Although there is growing evidence that cognitive behavioural approaches are effective in reducing fear of falling when combined with a multi-disciplinary intervention, these are not widely used.

1.5 Depression in later life

Although depressed mood is not the focus of this thesis, depression is one psychological factor that may both result from and contribute to the post falls syndrome. Therefore a brief review is given.

In general, epidemiological studies have found lower rates of depressive disorders in older adults, compared to other age groups (Kay & Bergman, 1980). Studies of populations over 65 report prevalences of major depressive disorder ranging between 2 percent to 4.8 per cent in stratified samples (Baltes *et al.* 1993; Beekman *et al.* 1995). Many studies report that depression is more common in women. However, Blazer *et al.* (2002) maintains that the assumed prevalences of late life depression underestimate the burden of depression in the community. Inconsistencies and apparent contradictions in the frequency of late life depression may arise from the effects of bias in case identification, cohort effects and co-morbidity (Blazer *et al.* 2002). It is suggested that this lends support to the notion that symptoms experienced by older adults may not map well on to existing diagnostic criteria, developed with younger age groups (Newmann, 1989). Age differences in ideational symptoms have been described by Musetti *et al.* (1989); older adults were less likely to display guilt, self-blame and suicidal ideation, although they appear to be more likely to complete suicide than younger individuals (Gulbinat, 1996). Another important age difference in both depression and anxiety is that older adults tend to report higher levels of somatic symptoms. The central question is whether these are a reliable indicator of depression, or anxiety, or whether they reflect physical co-morbidity. Blazer *et al.* (1987) reported that depressed older adults were more likely to have weight loss and constipation than younger adults; other investigators have found no age differences in somatic symptoms or in preoccupation with physical health (Kongstvedt & Sime, 1992).

However, although mood disorders are nearly as common in older adults as they are in the general population, both anxiety and depression are under detected and under treated (Small 1997; McDonald, 1986).

It is also likely that people under report; many people regard depression as being an inevitable consequence of growing older. This important misconception appears to be widely held, even by medical staff, and can mean that mood problems go untreated, or are treated inappropriately.

1.5.1 Mood disorders in medical patients

Physical health status, defined in various ways by number of medical conditions and medication use, functional disability, pain, and subjective perception of poor health, has consistently been found to correlate with depression. (Forsell *et al.* 1995; Kennedy *et al.* 1989). Once present, depressive symptoms have the power to worsen morbidity in medically ill patients (Rapp, Smith & Brit, 1990).

Penninx *et al.* (1996) found strong linear association between the number of chronic diseases and anxiety and psychological distress in a community based sample of 3076 people aged 55-85.

Schubert *et al.* (1992) report that depression is associated with decreased physical functional ability in stroke patients. Depression was suggested to lower functional ability by increasing fatigue, hopelessness, and decreasing motivation.

1.5.2 Morale, attitudes to ageing, effect on mortality

Although there have been considerable changes in attitudes to ageing, such as those described above, negative perceptions of ageing still operate at all levels, from that of the individual to that of society. It seems obvious that such beliefs might have the power to influence behaviour and mood; this will be examined in a number of areas.

Recently, Levy *et al.* (2002) examined the effect of self-perceptions of ageing on mortality, by using data from a longitudinal study carried out in 1975, matched with data from the National Death Index. They concluded that people who had had positive perceptions of their own ageing had lived 7.5 years longer than those with less positive perceptions. This advantage remained when age, gender, loneliness and functional health were included as covariates.

Much research has concerned itself with the question of whether a person's state of mind, or 'morale' has a direct effect on their physical health. This question has been extended to ask whether mortality can be influenced by a positive perception of one's health status. In an earlier paper, Idler and Kasl (1991) examined this by considering two alternative hypotheses: that previous findings were spurious; that other psychosocial factors were involved. They finally concluded that perceived health does have the power to predict mortality, irrespective of variables such as age, gender, medical conditions and social support (Idler & Kasl, 1991; Wolinsky & Johnson, 1992).

However, there is some disagreement as to how accurate people's self assessments of their health really are. Subjective health is usually measured with the question, "How would you rate your health at present?" with response categories such as "poor, fair, good" offered. There have been conflicting reports as to whether the answers to these reflect the extent and severity of medical conditions, or another construct related to stereotypes of ageing and identity. Baltes (1999), reports that as people age, there is a greater discrepancy between subjective perceptions of health and objective assessments of health- thus the subjective perception tends to remain constant, despite changes in the objective measures. Reports of subjective versus objective health also varies according to what measures are used to assess subjective health. When people are asked more detailed questions about their state of health, there is a greater correlation between the subjective and objective measures.

1.6 Anxiety in later life

1.6.1 Prevalence

Until recently, there has been little information on the nature and prevalence of anxiety disorders in later life. However, a number of studies report that, as in the general population, anxiety is a relatively common problem, distressing to those troubled by it.

In the US, The Epidemiological Catchment Area Survey (ECA) (Regier *et al.* 1988) reported a one month prevalence of 5.5 per cent for all anxiety disorders in people over 65, a figure which is lower than the 7.3 per cent reported for younger adults. Within this, phobias were the commonest types of anxiety disorder, accounting for 4.8 per cent. OCD (0.8 per cent) and panic disorder (0.1 per cent) occurred less commonly. The ECA study did not diagnose generalised anxiety disorder (GAD) if criteria for other anxiety disorders were met, in keeping with diagnostic criteria of DSM III-R. Therefore there was no estimate of the prevalence of GAD in that sample. Other studies, however, suggest that GAD is as prevalent as phobias in the elderly. Hopko *et al.* (2000) state that GAD is the most prevalent late-life anxiety disorder; Blazer (1997) suggests that GAD is more common than late life depression. The ECA data also reported that anxiety disorders were more than twice as prevalent as affective disorders in the elderly. Although affective disorders have rightly been identified as an important concern among older adults (Reynolds *et al.* 1993), Stanley and Beck (2000) note that anxiety disorders have not received as much attention as they deserve.

A relatively consistent finding is that anxiety disorders are less prevalent in later life than in earlier life (Regier *et al.* 1988). This finding has been replicated in a comparison of prevalence of anxiety in the Berlin Ageing Study (BASE, Schaub & Linden, 2000) between the old (70 to 84 years) and the old old (85 to 103 years). The overall prevalence was 4.5 per cent, consistent with findings from US studies. In the

younger old group the prevalence was 4.3 per cent; in the older group it was 2.3 per cent.

There are several theories postulated as to why anxiety disorders should be less common in later life, and less common still in very old age. It has been suggested that old age is characterised by the presence of effective coping strategies, that mitigate against the impact of life stress (Wisocki, 1988). It is also possible that anxiety is associated with greater mortality and morbidity, thus people who were anxious earlier in life do not survive into old age.

1.6.2 Problems with measurement

There are a number of difficulties in measurement of anxiety in the older population. Firstly, there are few measures which have been developed specifically for older adults. This is important, because many studies have shown significant differences in the way that older and younger people respond. This is particularly true of scales that load heavily on somatic components, which are endorsed more frequently by older people. These are likely to be strongly affected by co-morbid medical conditions more common in old age, such as COPD, or Parkinson's disease. (Stanley & Averill, 1999). Anxiety is commonly found to be co-morbid with depressive disorders (Blazer, 1997; Pearson, 1998; Schaub and Linden, 2000). However, there are a number of measures that can usefully be used with older adults such as the Beck Anxiety Inventory (BAI, Beck *et al.* 1988), and the Penn State Worry Inventory developed by Borkovec and colleagues (PSWI, Meyer *et al.* 1990). The PSWI is primarily a measure of worry, which provides a reliable way of distinguishing anxiety from depression in this age range (Stanley *et al.* 1997). Both of these are used in the current study.

1.7 Stress and Coping

As falls often result in either injury or increased awareness of potential for injury, they are perceived by many as acutely stressful events. It is therefore necessary to consider theories of stress and coping.

Stress in itself is widely considered to lead to ill health. The earliest models of stress considered it to be a physiological process in response to external events (Selye 1956). Selye's model, the general adaptation syndrome, identified three stages within the stress process; alarm in which the body is activated to cope with a stressor, resistance, and either exhaustion or recovery. This model does not acknowledge psychological components, or attempt to explain the emotional aspects of stress. Following on from this, research into the effect of 'life events' began to examine social and psychological causes of stress. Life events theory assumed that stress arose as a consequence of the type of life events people experienced, and that the degree of stress experienced could be predicted by the type and number of events (Holmes & Rahe, 1967) The work of Brown and Harris (1978, 1989) was particularly important in demonstrating causal links between life events and levels of depression. More recently, Kanner *et al.* (1981) found the frequency of more minor events, or 'daily hassles', to be more strongly associated with mental and physical health problems than major events per se. However, neither the general adaptation syndrome or the life events approach can account for individuals' differing responses and health outcomes to similar events; nor do they attempt to explain the processes intervening between external events and emotions or illness.

More recent models of stress and coping have grappled with internal cognitive processes that are likely to be central to the experiences and consequences of all types of stress.

The most influential of these has been developed by Lazarus and Folkman (1966, 1980, 1984). Lazarus proposes a transactional theoretical framework in which the person and the environment are seen in an ongoing relationship of reciprocal action.

Two processes mediate this relationship: appraisal and coping. Appraisal is the cognitive process though which an event is evaluated; primary appraisal considers the potential dangers of the situation; secondary appraisal considers what resources are available to cope with the threat. Lazarus suggests that the degree to which a person experiences psychological stress, that is, feels harmed, threatened or challenged, is determined by the evaluation for that specific situation of what is at stake and the coping resources available. Coping efforts are thought to serve two main functions: management of the source of stress, (i.e. problem resolution) and the regulation of stressful emotions. Although the processes of appraisal and coping response are most easily described as a linear sequence, Lazarus has emphasized that they do not necessarily occur in this way. Although appraisal influences coping, it is also likely that coping attempts affect appraisal and reappraisal.

1.7.1 Coping in response to appraisal

Two clusters of coping strategies have been distinguished: problem-solving strategies are efforts to do something active to alleviate stressful circumstances, whereas emotion-focused coping strategies involve efforts to regulate the emotional consequences of stressful or potentially stressful events. Research indicates that people use both types of strategies to combat most stressful events (Folkman & Lazarus, 1980). The predominance of one type of strategy over another is thought to be determined, in part, by personal style (e.g. some people cope more actively than others) and also by the type of stressful event; for example, people typically employ problem-focused coping to deal with potentially controllable problems such as work-related problems and family-related problems, whereas stressors perceived as less controllable, such as certain kinds of physical health problems, prompt more emotion-focused coping.

An additional distinction that is often made in the coping literature is between active and avoidant coping strategies. Active coping strategies are either behavioural or psychological responses designed to change the nature of the stressor itself or how one thinks about it, whereas avoidant coping strategies lead people into activities (such as alcohol use) or mental states (such as withdrawal) that keep them from

directly addressing stressful events. Generally speaking, active coping strategies, whether behavioural or emotional, are thought to be better ways to deal with stressful events, and avoidant coping strategies appear to be a psychological risk factor or marker for adverse responses to stressful life events (Holahan & Moos, 1987). However, research using the Ways of Coping Scale (Lazarus & Folkman, 1980), a scale designed to measure the two broad types of coping, problem-focused versus emotion-focused, has suggested that in practise this distinction is too simple. Typically, responses to the Ways of Coping scale form several factors (Scheier *et al.* 1986; Folkman & Lazarus, 1980). In response to an increasing number of domains of theoretical interest, Carver *et al.* (1989) developed a new scale, the COPE, incorporating 15 subscales, each purported to measure distinct aspects of coping. Five subscales measure different types of problem-focused coping (active coping, planning, suppression of competing activities, restraint coping, seeking of instrumental support), five subscales measure aspects of what could be considered emotion-focused coping (seeking of emotional support, positive reinterpretation, acceptance, denial, turning to religion), and three scales measure coping responses thought to be dysfunctional (focus on and venting of emotions, mental and behavioural disengagement). Two other subscales measure use of humour and alcohol and drugs as coping strategies. Rather than use conceptually simpler dimensions of coping, a scale such as this allows more detailed exploration of how types of coping are used in a particular situations.

1.7.2 Coping in older adults

There has been much debate about whether coping styles change across the life span, or whether they are stable within each individual. Cross sectional studies have illustrated differences in the types of life stresses experienced by older and younger adults (Pearlin & Lieberman, 1977). Debate about whether coping changes or not seems to mirror underlying dichotomous approaches to ageing and personality development. Whereas one approach focuses on life-span changes, the other focuses on invariance and stability. After an initial period of growth and development, a person's personality is seen as firmly established.

However, it is arguable that such polarisation is inappropriate, as none of the types of consistency preclude all change. McCrae and Costa (1990) note that behaviours, habits attitudes and social roles are all likely to change during adulthood. However they maintain that enduring personality traits do not alter significantly, and they maintain that these traits form an important part of the concept of self, or identity.

Findings from the Bonn Longitudinal study on Ageing (BOLSA) indicated that coping response patterns to stresses in the areas measured, (family and health) remained consistent over the 15-19 year span of measurement. Rott and Thomae (1991) suggest that this consistency emphasizes the role of the individual person in the process of dealing with stress without necessarily supporting a trait-oriented conceptualisation of coping as they did not find evidence of associations between preferences of type of coping and personality dimensions. Rather, type of coping reflected habits, perceived roles and norms regulating daily lives (Thomae, 1986).

1.7.3 Coping and illness

Coping has also been examined in response to a number of chronic medical conditions, such as multiple sclerosis, arthritis and pain (Pakenham & Stewart, 1997). Such studies have tended to use the problem-focused versus emotional-focused coping paradigm. Numerous studies have reported that high levels of distress are related to a reliance on emotion-focused coping (Revenson & Felton, 1989; Thompson *et al.* 1992); the use of avoidance (considered to be an emotion-focused strategy) was found to be associated with higher levels of psychological distress in people with physical illness (Matlin *et al.* 1990). However, other studies have found less support for the proposed positive effects of problem-focused coping (Keefe *et al.* 1987).

The relationship between cognitive appraisals of an illness and levels of distress has been well established (Vitiliano *et al.* 1990). A number of studies have found an association between high levels of threat appraisals and poorer adjustment (Thompson *et al.* 1992), although there is less evidence for an association between controllability appraisals and better adjustment.

A criticism of research into adjustment to chronic illnesses is that it has neglected potentially important psychological aspects of adjustment, such as appraisal and coping (Coolidge *et al.* 2000). A criticism of research into the role of coping in the chronic illness field is that it has failed to examine links between coping strategies and illness related physical stressors.

1.7.4 Coping and anxiety

As coping inherently involves appraisal of threat or danger, and can be described as an attempt to master demands that are appraised as exceeding or taxing one's resources (Monat & Lazarus, 1991), it seems likely that coping strategies will be associated with the severity of distress experienced. It is possible that effective coping strategies may protect a person from cognitive, environmental and biological factors that may bring about symptoms of anxiety. In a study of coping styles among depressed and anxious psychiatric inpatients, Hoffart and Martinsen (1993) reported that patients with anxiety were significantly more likely to have emotion focused or avoidant coping styles than depressed patients. The use of avoidant strategies was maintained through the course of treatment, though use of emotion focused strategies decreased with treatment. This seems to suggest that there may be some significant relationships between coping styles and anxiety symptoms, though definitive conclusions cannot be made at present.

One study investigated the relationship between coping strategies and anxiety symptoms among older adults in comparison with a group of younger adults (Coolidge *et al.* 2000). This study aimed to explore evidence that older adults dealt with stress in different ways to younger adults. Coolidge *et al.* found that different coping strategies were used by anxious and non anxious older adults, and by older and younger adults: older anxious adults tended to report greater use of dysfunctional coping than non anxious older adults, older anxious adults used problem focused coping more than younger adults.

1.8 Health belief models

As this study examines emotional correlates of falls and fall related behaviour, such as activity restriction, it is necessary to briefly review models that attempt to explain the complex interactions between psychological factors and behaviour.

As has been previously described in section 1.4.5, Bandura's social cognitive theory gave rise to the concept of self-efficacy and outcome expectancy beliefs as predictors of health related behaviours (Bandura, 1986). The health belief model (Becker *et al.* 1977) adopts a slightly different slant, proposing that behavioural decisions are made with a cost- benefit analysis approach that includes consideration of the elements of perceived susceptibility to illness, severity, perceived benefits of engaging in a behaviour, perceived costs, and cues to action that prompt the decisional process. According to this model, engagement in health-protective behaviour is most likely if the risk of disease and its perceived severity are high, the behaviour is considered effective in reducing its risk and the immediate costs of the behaviour are low. Studies of the use of the model have produced highly variable results (Harrison *et al.* 1992). Criticisms are that this model takes no account of social or environmental factors that may influence decision-making, nor does it clarify the links or interactions between the factors. A third theory considered to be of use for the present study is protection motivation theory (Rogers, 1983), which combines aspects of both models.

Protection motivation theory is similar to coping theories of response to stress, in that it focuses on two categories of response, threat appraisal and coping appraisal, to predict response to health threatening information. As in the health belief model and coping models, threat appraisal is considered to be a function of both perceived susceptibility to illness and its severity; coping appraisal is a function of outcome and efficacy beliefs.

1.9 Summary of the introduction

Research into the prediction of falls in elderly people has demonstrated the significance of psychological factors, which are assumed to contribute to a falls related syndrome. This syndrome consists of avoidance of activity, loss of confidence in movement, and the acknowledgement of fear or concern about future falls. Although this syndrome is commonly known as 'fear of falling', it has alternately been theoretically constructed as a phobic-like state (Bhala, 1982) or as a lack or change in specific falls-related self-efficacy, following Bandura's social learning theory (1978; 1986). Another conception suggested by Myers *et al.* (1996) and Burker *et al.* (1995) is that the syndrome reflects a more general state of anxiety.

Clinically, it seems that the presence of 'excess disability' in the form of activity restriction is the most important outcome variable, as it has the power to influence further physical decline. In conjunction with the theory of self-system and identity, activity restriction may be conceived as a paradoxical attempt to avoid a negative possible self. Activity restriction may also represent loss of self-schemas concerned with physical functioning. It is therefore hypothesised that people who present with lower levels of activity will have higher levels of anxious and depressive symptoms.

Falls related efficacy has been demonstrated to be significant predictive factor for the outcome of activity restriction and increased risk of further falls. In keeping with models of behaviour and health behaviour such as Bandura's social cognitive theory and Protection Motivation theory (Rogers, 1993), outcome expectancy beliefs, and appraisals about illness severity and susceptibility are hypothesized to be relevant to the expression of activity restriction and presence of fear of falling. These are operationalised in terms of misconceptions about physical activity and ageing.

Also in keeping with the above models, use of coping strategy is expected to influence outcomes of people who have fallen. No studies were found that had investigated the use of different coping strategies in people who have fallen, although other studies looking at coping in other physical illnesses have demonstrated

associations between coping style and psychosocial adjustment to illness. Those studies suggest that the use of emotion-focused, or avoidant strategies, is associated with worse adjustment, and the use of problem-focused strategies is associated with better adjustment. An aim of this study therefore is to explore the use of coping strategies in older adults who have fallen.

2 Research Aims

This project has three main aims.

The first aim is to explore the three alternative conceptualisations of the fear of falling syndrome, as defined by being afraid of falls, lacking confidence to move, or by the presence of anxiety.

The second aim is to explore the effects of appraisals about health status and ageing on anxiety and activity restriction. Do negative views about ageing, including a sense of uncontrollable physical deterioration, contribute to feelings of vulnerability and anxiety in people who have fallen? Are specific health misconceptions associated with activity restriction? Are attributions about the predictability, avoidability and controllability of falls associated with differences in anxiety, falls confidence or activity?

A third aim is to explore the use of coping strategies among fallers. It is hypothesized that use of different coping styles will be associated with higher levels of anxiety or activity restriction.

2.1 Research Question

The research question is therefore, "Are anxiety, falls confidence, fear of falling or levels of activity, in older people who have fallen, influenced by methods of coping, or attributions concerning health and falls?"

3 Hypotheses

3.1 Comparison of falls syndrome conceptualisations

People who report being afraid of falling will report elevated scores in measures of anxiety, worry, depression, and lower scores in measures of falls confidence, activity, and physical mobility.

People with lower scores of confidence will be a) more anxious b) more worried, c) more depressed, d) less active, and c) less physically able.

People with higher scores of anxiety as measured by the Beck Anxiety Inventory will be a) more worried, b) more depressed, c) less confident d) less active, and e) less physically able.

3.2 Effects of beliefs about health status

People with elevated scores of a) anxiety, and lower scores of b) confidence and c) activity will report lower morale about ageing.

People reporting elevated scores on measures of activity and falls confidence will be less likely to hold strong specific health misbeliefs.

Participants who reported not knowing why they fell will be a) more anxious, b) more worried c) less confident, d) less active.

Participants who reported that their falls were unavoidable will be a) more anxious, b) more worried c) less confident, d) less active.

3.3 Effects of coping styles

Participants who report a) less anxiety b) higher falls confidence and c) higher levels of activity will use problem-focused styles of coping.

4 Methodology

The proposed study was discussed with the consultant geriatrician, the head of physiotherapy and the staff nurse at the intended data collection site, a geriatric medical day hospital. Having gained their support, a protocol and an application for ethical and management approval were submitted to the local ethics committee for formal consideration. Subsequently, data collection was carried out in accordance with their stipulations. An additional data collection site was added to maximise recruitment; this second site was under the management of the same geriatrician and received similar types of referrals.

4.1 Participants and recruitment

Participants were recruited from two geriatric medical day hospitals, from people referred for falls prevention management or improvement of mobility by their General Practitioner or another consultant. These were medically stable people over the age of sixty-five, living in the community, who either had a history of falling, or who were considered to be at high risk of falling as a result of medical conditions such as osteoporosis, stroke, or chronic dizziness. Potential participants were selected at one site by their physiotherapists and at the other by the staff nurse. The selectors were asked to consider the following inclusion and exclusion criteria.

The inclusion criterion was:

- Presence of either a history of falls or a high risk of falling, meriting referral to the Day Hospital.

Exclusion criteria were:

- Presence of alcohol or substance abuse, on the grounds that these could confound reports of anxiety.

- Evidence of marked cognitive decline, as determined by Mini-Mental State Exam (MMSE, Folstein *et al.* 1975) scores of 23 or less, and the clinical judgment of the lead geriatrician.

- Presence of major mental illness or moderate-severe head injury.

After people had been deemed appropriate for inclusion in the study by members of the day hospital clinical team, they were asked by clinical staff if they were willing for the lead researcher to approach them to discuss their participation in the study. If they were willing, they received an invitation letter, a patient information leaflet, and had the opportunity to discuss this with the lead researcher. If they wanted to participate, they were asked to sign a consent form. The invitation letter, the patient information leaflet and consent form are included as appendices.

Following inclusion into the study, the lead researcher made appointments with each participant at the day hospital, to undertake a structured interview, administer questionnaires and ask the participant to complete an activity diary for a week. Data routinely gathered by the clinical team on physical fitness was collected from participants' medical notes. It was estimated at the start of the study that completion of the data collection could be done within two forty minute interviews by carrying out a pilot of the measures with two volunteers of similar age to study participants.

However, this rarely occurred in practise. Some subjects wished to complete the questionnaires themselves at home; many required to have the lead researcher administer these directly, due to visual and motor difficulties with reading and writing. Interviews had to be kept short in order that they could be scheduled around the busy day hospital programme and so as not to excessively tire participants. Fatigue after sessions of physiotherapy and other medical investigations often meant that participants asked to delay or curtail data collection. Therefore on average, most cases required four meetings to complete data collection, and some required more. Participants who had reduced MMSE scores, suggestive of some cognitive decline, often required more time to answer questionnaires. One third of the participants only attended the hospital once a week, which had the effect of reducing the data

collection period once consent had been obtained. Some participants were therefore lost to the study as they were discharged before data collection could be completed.

Participants' General Practitioners were informed of their inclusion in the study by letter.

97 people were given information about the study and asked if they would consider taking part. Of those, 45 refused and 40 agreed. Twelve were discharged before they could agree to take part. Of the 40 who agreed, complete data was collected from 32 people. Of the eight from whom data was not collected, two were unable to manage the questionnaires due to cognitive difficulties, three decided not to continue, and three were admitted to hospital with medical complaints during data collection.

4.2 Ethical considerations

A number of ethical issues were taken into consideration in the planning of the methodology of this study. Firstly, there was the possibility that participants would not be able to give informed consent to the study, as they were drawn from a group with increased prevalence of age-related cognitive difficulties such as dementia. This was addressed by designing exclusion criteria to make sure that people who were unable to give informed consent would not be approached as potential participants. Secondly, there was the possibility that answering questions posed by the study would raise participants' sense of distress. It was planned to address this by using careful interviewing and by informing participants that their involvement with the study could be immediately terminated if they wished. It was planned that other medical professionals could be alerted should participants become distressed or feel unwell. Thirdly, there was the possibility that involvement with the study might impact on participants' availability for treatment. Great care was taken to communicate with medical staff providing treatment throughout the data collection period in order to avoid this.

4.3 Measures

Copies of the measures used are included in the appendices. Measures used were as follows:

4.3.1 Beck Anxiety Inventory (BAI; Beck *et al.* 1998)

This is a widely used 21-item scale that provides an overall measure of severity of anxiety. It takes approximately five to ten minutes to administer. Although the BAI was developed and standardized for use with younger adults, it has been demonstrated to have adequate psychometric support in use with older adults (Morin *et al.* 1999) and older medical outpatients (Loebach *et al.* 1997). A comparison of elderly psychiatric patients and community controls by Kabacoff *et al.* (1997) suggests that the BAI also has adequate discriminant validity. It is common that elderly individuals present with more somatic concerns than younger individuals; Morin *et al.* (1999) noted that in their study the somatic factor accounted for the largest proportion of the variance in scores. They suggested that this could either be due to older people tending to somatise their anxieties, or due to interference from co-existing medical conditions. Medication side effects can also produce anxiety-like symptoms (Cohen, 1991). It was therefore decided to address this by additionally assessing anxiety using a worry scale with no somatic components.

4.3.2 Penn State Worry Questionnaire (PSWQ, Meyer *et al.* 1990)

This is a 16-item scale designed to give a measure of the extent and pervasiveness of worrying thoughts. It has been demonstrated to have good internal consistency and adequate convergent validity when used with older adults (Beck, Stanley & Zebb, 1995). It was estimated to take about five minutes to administer. The scale items are a series of statements such as "I worry all the time"; the task is to consider 'how typical of you' each statement is on a five point scale, from 'not at all typical', to 'very typical'. During face-to-face administration, prompts were used, such as "Is this statement typical of you?"

4.3.3 Weekly Activity Diary.

Participants were asked to briefly note down on a structured sheet what they had been doing on each day of the week. For participants who were unable or who did not wish to fill this in themselves, the researcher asked them verbally about their daily activities. The diaries were used to calculate two activity scores: a tally of the number of trips out of the house per week, and the total number of hours spent out of the house. Time spent in the garden was counted if it included gardening activity.

4.3.4 Geriatric Depression Scale, (GDS -15; Sheikh & Yesavage, 1983)

This is a 15-item scale designed to detect symptoms of depression in a geriatric population. It takes approximately five minutes to administer. The larger 30 item GDS was developed especially for use with older adults. Specifically, a yes/no format was instituted to simplify answer choice, and evaluation of somatic symptoms was eliminated in order to create a measure that was more focused on depression. Data indicate that the GDS has strong internal and criterion validity, and displays consistency across time. The GDS also has good psychometric support and discriminant validity when used in an anxious elderly group (Snyder *et al.* 2000). The 15 item GDS was devised in order to avoid fatigue during administration, and has been found to correlate highly with the original 30 item version (Lesher & Berryhill, 1994). It was decided to use the short form in this study.

4.3.5 Attitude Toward Own Ageing subscale of the Philadelphia Geriatric Morale Scale (PGMS; Lawton, 1975)

This is a 5-item subscale that provides a measure of positivity and negativity towards ageing. Attitude towards ageing as measured by this scale has been linked to increased longevity (Levy *et al.* 2002). The scale takes approximately three minutes to administer.

4.3.6 Falls Efficacy Scale, (FES; Tinetti *et al.* 1990)

This is a widely used 10-item scale, designed to measure perceived efficacy at avoiding falls. It is based on the operational definition of fear as "low perceived self-confidence at avoiding falls during essential, relatively non-hazardous activities". It emphasizes mainly home-based activities, and takes approximately five minutes to administer. Briefly participants were asked how concerned they were about the possibility of falling while performing different activities. If participants indicated that they did not perform that activity, they were encouraged to answer hypothetically. In development of the scale, Tinetti *et al.* (1990) reported good test-retest reliability. Additional psychometric support is provided by Powell and Myers (1995) in their development and comparison of a similar measure, the Activities-specific Balance Confidence Scale.

4.3.7 Activities-Specific Balance Confidence Scale (ABC, Powell & Myers, 1995)

The design of this scale is similar to that of the FES. It accesses specific balance confidence and is highly correlated with objective physical performance measures. It takes approximately five minutes to administer. The ABC was designed in response to criticisms of the FES that indicated that there was a possible ceiling effect when the FES was used with higher functioning people. The ABC samples a wider continuum of daily activity and is more detailed in its activity descriptions. This is important as situation specific questionnaire items show a better correspondence with performance measures (Myers, Holliday, Harvey *et al.* 1993). It was therefore decided to use both the FES and the ABC, as it was not known what level of functioning the participants would have.

4.3.8 COPE, (Carver, Scheier, Weintraub, 1989)

This is a 60-item, multi-dimensional inventory of coping, designed to assess a predetermined set of ways that people respond to stresses either generally or on specific occasions. Unlike previous measures of coping, the development of the COPE was theoretically rather than empirically guided. It provides a broad measure

of whether people are using problem-focused or emotion-focused strategies, and also a more specific estimate of fifteen conceptually distinct aspects of coping within these categories. Five subscales measure different types of problem-focused coping (active coping, planning, suppression of competing activities, restraint coping, seeking of instrumental support), five subscales measure aspects of what could be considered emotion-focused coping (seeking of emotional support, positive reinterpretation, acceptance, denial, turning to religion), and three scales measure coping responses thought to be dysfunctional (focus on and venting of emotions, mental and behavioural disengagement). Two other subscales measure use of humour and alcohol and drugs as coping strategies. It takes approximately 15 minutes to complete. In the development of the scale, Carver *et al.* (1989) reported that the COPE had acceptable internal consistency, test-retest reliability and construct validity.

4.4 Structured interview

This included demographic information, such as age, gender, and presence of fall history, number of falls, and number of chronic health problems.

Participants were asked a series of Yes/No answer questions that covered: experience of injury from falls (i.e. hospitalisation, medical treatment), experience of getting up after a fall, whether a fall had precipitated a change in their activity levels, living alone, using stairs, use of walking aids, the presence of handrails at home, moves to different accommodation due to fall risk, and whether past falls seemed controllable, predictable or avoidable.

Participants were asked to rate their health as poor, fair or good. They were asked to rate on a scale of 0-100 (where 100 is equivalent to the greatest fear or sense of risk) both how afraid they were of falling again, and their perceived risk of future falls.

A brief health belief questionnaire was created, consisting of six statements and a six point Likert scale to indicate agreement or disagreement. This was developed in conjunction with clinical staff in the Medical Day Hospital, by asking staff about common misconceptions held by patients. The statements asked about beliefs about the harm of breathlessness, tiredness, and activity, and about muscle weakening as an inevitable consequence of old age.

4.5 Functional assessment

Information on functional status assessed routinely by the clinical team was gained from participants' medical notes. These included measures of walking speed, time to get up from a chair, the Elderly Mobility Scale (Smith,1994), and the Barthel Index (Mahoney & Barthel, 1965). Number of chronic medical conditions was recorded from the medical notes, as was the number of daily medications taken by each participant.

4.6 Resources

The University of Edinburgh and the East of Scotland Training Course in Clinical Psychology funded the principal researcher's time, and provided resources for photocopying, stationery, travel expenses, postage, SPSS licence, and the purchase of licenced assessment measures.

4.7 Data handling and analysis

4.7.1 Power

It was calculated that a sample size of 60 participants was required for this study to achieve power of 0.8 and alpha at 0.05. However, due to the restraints imposed on data collection by low rates of referral and uptake, the constraints of collecting data within the day hospital environment and the lengthy completion times, a sample size of 30 was recruited. It is likely therefore that study is underpowered.

4.7.2 Data handling

The data was entered into a database using the Statistical Package for Social Sciences SPSS. The procedure suggested by Tabachnick & Fidell (2001) for screening ungrouped data was followed. Accuracy of data entry was confirmed by checking written data sheets against the data view, and by generating minimum and maximum

values, means and standard deviations for each variable. These were inspected to ensure that data were in a plausible range.

There remained some missing data after screening for accuracy. In the majority of cases, this was data from the physical variables obtained from the participants' medical notes. Consideration of how to treat missing data followed recommendations by Tabachnick & Fidell (2001). In cases where the missing value had not been given because the participant had been deemed 'able' or unable' by their physiotherapist, for example, in a test of speed of walking, a value was estimated according to test parameters and guidelines. Where the value was absent because the patient had been unable to do the test task, a value of the slowest time plus one was entered. Where the participant had been deemed 'able', a value of the ability range plus one was entered.

All but two participants had had a fall. Though these participants met inclusion criteria for being at risk of falling, they were excluded from the study, as there was missing data on all the fall related variables.

Box plots were generated to illustrate univariate outliers. These were then considered on a case by case basis with reference to Tabachnick and Fidell, (2001). There were only three outliers, within two of the physical measures. These were found to be excessively long times taken to complete physical tasks, indicating a high level of difficulty with those tasks. As the outliers were likely to be increasing the skew of the distribution of these variables, it was decided to modify the raw scores to one unit larger than the next most extreme score (Tabachnick & Fidell, 2001).

4.7.3 Normality

Normality is the assumption that variables are normally distributed. Although the assumption of normality is made in the derivation of many statistical tests, the importance in an analysis of a data set is not known. It is considered that parametric tests are reasonably robust even under conditions where the assumptions of normality are violated (Tabachnick & Fidell, 2000).

Variables were tested for normality by generating normal expected probability plots, examining histograms and by determining whether measures of skew and kurtosis were within range.

Scatter plots were generated for variables that did not correlate as expected, to test for linearity and homoscedasticity.

4.7.4 Transformation

After having dealt with missing data and outliers and having tested variables for normality, three variables were transformed with a log 10 transformation in order to achieve normality. This was done in order to satisfy the assumptions of the approximation to the normal distribution and to allow use of parametric statistical tests. Transformed variables are reported as such.

4.8 Consideration of redundant variables

In order to avoid missing important qualitative differences, in some cases more than one measure of each area of interest were taken. An early stage of analysis therefore was the comparison of measures expected to measure similar domains of functioning, followed by the discarding of redundant variables prior to the main analysis. This process is discussed subsequently. Consideration was given to the degree of correlation between variables; high correlations between variables indicate multi-collinearity or singularity, and may be more indicative of overlap between measures rather than association of variables. Consideration was also given to the distributions of scores, and theoretical aspects of measures.

4.8.1 Measures of anxiety

Two measures of anxiety were taken, the Beck Anxiety Inventory, measuring somatic and cognitive symptoms of anxiety, and the Penn State Worry Questionnaire, designed to measure cognitive worry only. Although these two measures were significantly positively correlated ($r = .393$, $p = .032$, two-tailed) it was decided to retain both measures, as they are considered to measure different aspects of anxiety.

4.8.2 Measures of falls confidence

Two measures were employed, the Falls Efficacy Scale and the Activities-Specific Balance Confidence Scale. These measures are similarly structured and have some content overlap. As expected, these measures were highly correlated with one another ($r = .572$, $p < .001$, two-tailed). It was decided to discard the Falls Efficacy Scale, as the ABC samples a wider range of activities and has been reported to have greater utility as an evaluative index for older adults at a moderate to high level of functioning (Myers, Powell & Maki *et al.* 1996).

4.8.3 Measures of physical ability

The measures of physical ability, including walking speed, time to get up from a chair, and a combined mobility scale, were highly correlated with one another ($r >$ .732, $p < .001$, two-tailed). As the correlation co-efficients were above 0.7, a point above which Tabachnick and Fidell (2001) suggest that variables become collinear, it was decided to choose one of these variables for the main analyses. The Elderly Mobility Scale (Smith,1994), was selected, although it was significantly positively skewed, on the grounds that it had had the least missing data, and that it provided a composite measure of physical mobility skills. A log 10 transformation was performed on this variable, after which it met assumptions of normality using the Kolmogarov-Smirnof goodness of fit test.

4.8.4 Measures of activity

Two measures were drawn from the weekly activity diaries kept by participants: the number of visits outside the home per week, and the number of hours spent outside the house per week. These correlated extremely highly ($r = 0.817$, $p< 0.01$, two-tailed). It was therefore decided to use only the number of visits out per week in the subsequent analyses, as the measure of number of hours was highly skewed.

5 Results

5.1 Sample characteristics

The sample consisted of 30 participants, ranging in age from 65 to 90 years of age. The median age was 79, the mean was 79.3, and the standard deviation was 6.62.

53.3 per cent of the sample were male ($N = 16$), 46.7 per cent were female ($N = 14$), giving a male to female ratio of 1.14: 1. This is a much more balanced ratio than usually found in samples of this age.

56.7 per cent ($N = 17$) of the sample were currently married and living with a spouse, 6.7 per cent ($N = 2$) were divorced, and 23.3 per cent ($N = 7$) were widowed and living alone. 13.3 per cent ($N = 4$) had never married.

When considered by gender, men's mean age was 80.19, (SD = 5.50), and female mean age was 78.36 years, (SD = 7.81). There was no difference of age by gender ($t = 0.749$, d.f. = 28, $p = .460$, 2-tailed).

Of the men, 64.7 per cent were currently married and living with a partner, compared to 56.7 per cent of the women. 31.3 per cent of men were widowed, single or divorced and living alone, compared to 57.1 per cent of women.

5.1.1 Medical characteristics

All participants had co-morbid medical conditions, ranging in number from two to ten. On average, this sample had a median of six medical conditions, (mean = 5.43, standard deviation = 1.92). 53 per cent had osteoarthritis ($N = 16$); 50 per cent had vascular problems, 43 per cent had cardiac conditions ($N = 13$); 43 per cent had hypertension ($N = 13$); 26.7% had diabetes ($N = 8$), 13.3 per cent had COPD ($N = 4$), 13 per cent had Parkinson's disease ($N = 4$), 10 per cent had osteoporosis ($N = 3$), and 6.7 per cent had hypotension ($N = 2$). 26.7 per cent also had a documented history of depression. ($N = 8$). They were taking a median of six different types of medication, ranging from 0 to 13, (mean = 6.2, SD =3.09).

46.7 per cent ($N = 14$) of participants rated their health as 'good'; 46.7 per cent ($N = 14$) rated it as 'fair' and 6.7 per cent ($N = 2$) rated their health as 'poor'.

In terms of cognitive status, most participants (73.3 per cent, $N = 22$) had not received the Mini Mental State Examination (MMSE); in both day hospitals this was only given if staff had raised concerns about a patients' cognitive status. Only eight (26.7 per cent) participants had received the MMSE, scoring from 25 to 29 out of 30. In one hospital, the Abbreviated Mental Test (AMT) (Jitapunkel *et al.* 1991) was used more frequently; if a patient scored below 9 on a score range of 0 - 10, they were subsequently given the MMSE. 70 per cent ($N = 21$) of the sample had received the AMT. Their use suggests that 13 per cent of the sample showed indications of mild cognitive impairment.

5.1.2 Anxiety and worry and depression

Table 1 Mean scores on measures of anxiety depression and worry

	N	Minimum	Maximum	Mean	SD
BAI Anxiety	30	1.00	30.00	14.80	9.30
PSWQ Worry	30	17.00	71.00	41.73	15.93
GDS Depression	30	0	13.00	5.80	3.22

BAI scores ranged from 0 to 30. The mean BAI score was 14.80 (SD = 9.30), which fell within the range considered clinically anxious (scores 10-66; Beck *et al.* 1988). 33.3 per cent of the sample ($N = 10$) scored within the normal non-anxious range (scores 0 – 9); 33.3 per cent scored within the 'mild to moderate' range ($N = 10$); 26.7 percent scored within the 'moderate' range ($N = 8$); 6.7 per cent of participants scored within the severe range of the BAI ($N = 2$).

PSWQ scores ranged from 17 to 71. The mean worry score was 41.73 (SD = 15.93). Although scoring categories are not available for the PSWQ, a normative study by Molina and Borkovec (1994) reported that the mean score for a general population was 47.65, and the mean for a sample with Generalised Anxiety Disorder was 67.66.

Comparison with these figures suggests that this sample experiences less worry than a sample with generalised anxiety disorder.

GDS scores ranged from 0 to 13. The mean score was 5.80 (SD 3.22). Scores above 5 are considered to be indicative of the presence of depression (Sheikh & Yesavage, 1986); 53.3 per cent ($N = 16$) of the sample scored in the clinical range. A correlational matrix was generated using Pearson's t test of linear correlations to illustrate associations between variables. Correlations are reported in Table 2.

Table 2 Correlations between measures of anxiety, worry, depression, falls confidence, activity and physical ability (Pearson's *r*, 1-tailed)

Variable	1	2	3	4	5	6
1. Anxiety	--					
2. Worry	***r* = .393** ***p* = .016**	--				
3. Depression	*r* = .387 *p* = .17	*r* =.260 *p* = .083	--			
4. Falls Confidence	*r* = -.154 *p* = .208	*r* =.057 *p* = .382	*r* = -.080 *p* = .338	--		
5. Activity	.086 *p* = .325	.235 p = .106	-.104 p = .292	**.572** **p < .001**	--	
6. Physical ability transformed	*r* =.111 *p* = .279	*r* = -.070 *p* = .357	*r* =.294 *p* = .057	*r* = -.452 ***p* = .006**	*r* = -.465 ***p* = .005**	--

There was a significant positive correlation between anxiety and worry. There were no significant correlations between depression and anxiety or worry. There were no correlations between falls confidence and anxiety or worry. Falls confidence, activity and physical ability inter-correlated significantly. (NB negative correlations for physical ability are an artefact of transformation).

5.1.3 Data obtained from the structured interview regarding falls

All members of the sample had experienced a fall in the year before assessment. The number of total falls experienced by the sample ranged from one to twenty. This last was a gentleman with Parkinson's Disease. The median number of falls was three, (mean 3.9, SD 3.717). Two participants had broken their hip bones by falling, which had resulted in long stays in hospital. However 50 per cent of the sample had not had to stay overnight in hospital following falls. 43 per cent ($N = 13$) reported one hospitalisation, and 6.7 per cent ($N = 2$) reported two hospitalisations.

60 per cent ($N = 18$) of the sample reported that they were unable to get themselves up after their worst fall; this included people who had been helped up by ambulance drivers or bystanders.

46 per cent ($N = 14$) of the sample reported that they did not know why they had fallen, or what may have caused them to fall. 70 per cent ($N = 21$) reported that the falls that they had were unavoidable.

Two people reported that their fall resulted in an enforced change in their accommodation to either supported accommodation, or to a ground floor dwelling. A further two people were waiting for more suitable accommodation to be found for them.

5.1.4 Falls Confidence

Mean scores on measures of falls confidence, activity and physical mobility are reported in Table 3.

Table 3 Mean scores on measures of falls confidence, activity and physical mobility

	N	Range	Min.	Max.	Mean	SD
ABC	30	1360.00	100.00	1460.00	722.63	370.96
FES	30	79.00	21.00	100.00	62.07	22.27
Activity: no. of outings	30	16.00	.00	16.00	6.50	5.34
Activity: no. of hours out	30	35.00	.00	35.00	11.15	9.31
Elderly Mobility Scale	30	14.00	6.00	20.00	15.63	4.03
Timed up and go (seconds)	30	72.00	5.00	77.00	35.13	20.98
Timed 6m walk (seconds)	30	28.00	3.00	31.00	15.27	8.78

5.1.5 Health beliefs and ageing morale

Table 4 Likert scale scores indicating strength of belief in six statements. Scores above 3.5 indicate agreement.

Health Belief	N	Mean	SD	Median	Agree	Disagree
Being out of breath is bad for my health	30	4.33	1.688	5	22 (73.3%)	8 (26.7%)
Being tired is bad for my health	30	4.03	1.608	4.5	19 (63.3%)	11 (36.7%)
I must not wear myself out	30	4.80	1.297	5	25 (83.3%)	5 (16.7%)
My muscles and ligaments are becoming weaker because of old age	30	4.67	1.470	5	23 (76.7%)	7 (23.3%)
I must save my strength by doing less	30	3.97	1.671	4.5	20 (66.7%)	10 (33.3%)
It will not be possible for me to regain strength in my muscles once I have lost it	30	3.10	1.517	3	11 (36.7%)	19 (63.3%)

Likert scores for these statements were 1 = strongly disagree, 2 = moderately disagree, 3 = slightly agree, 4 = slightly agree, 5 = moderately agree, 6 = strongly agree. The majority of participants agreed with all of these statements except the last, "It will not be possible for me to regain strength in my muscles once I have lost it" with which more people disagreed than agreed.

5.1.6 Coping

Descriptive statistics relating to the COPE are detailed in table 5

Table 5 Mean values on Coping scale

Coping strategy	N	Minimum	Maximum	Mean	SD
Active coping	30	6.00	16.00	11.23	2.69
Planning	30	5.00	16.00	10.70	2.31
Seeking instrumental support	30	4.00	16.00	9.77	3.34
Seeking emotional support	30	4.00	16.00	9.43	4.14
Suppression of competing activities	30	5.00	15.00	9.17	2.44
Religion	30	4.00	16.00	8.67	4.46
Growth	30	5.00	16.00	11.50	2.84
Restraint	30	4.00	16.00	11.33	2.76
Acceptance	30	6.00	15.00	11.43	2.24
Focussing on and venting emotions	30	4.00	14.00	8.70	2.69
Denial	30	4.00	14.00	6.73	2.99
Mental disengagement	30	5.00	15.00	9.30	2.72
Behavioural disengagement	30	4.00	12.00	7.17	2.46
Alcohol or drug use	30	4.00	8.00	4.47	1.25
Humour	30	5.00	16.00	8.93	3.24
Problem focused coping (composite)	30	31.00	74.00	52.20	10.37
Emotion focused coping (composite)	30	37.00	69.00	49.97	9.56
Dysfunctional coping (composite)	30	22.00	51.00	36.37	6.67

Each item of the COPE is scored on a Likert scale, 1 = I don't do this at all, 2 = I do this a little bit, 3 = I do this a medium amount, 4 = I do this a lot. Each subscale is the sum of four items, therefore a score of 12- 16 indicates that the majority of responses for that scale were "I do this a lot".

5.2 Statistical analysis of hypotheses

Examination of the data revealed that the majority of variables were normally distributed, or could be transformed to meet the assumptions of approximation to the normal distribution. It was therefore decided to use parametric statistical analyses throughout. Although some variables were ordinal, for example, the Likert Scales, it is argued that they can be treated as continuous variables if they are considered to reflect an underlying continuous scale, and can satisfy other assumptions of parametric analysis (Tabachnick & Fidell, 2001).

Associations between variables were illustrated using Pearson's r correlations; bivariate analysis was carried out using independent t-tests; categorical variables were compared by using Chi-square tests.

To facilitate comparisons, a number of continuous variables were also dichotomised. The Beck Anxiety Inventory was dichotomised at the point distinguishing 'non anxious' from 'mildly anxious' (Beck *et al.* 1988); depression as measured by the GDS was dichotomised at the point distinguishing 'non-depressed' from 'depressed' (Sheikh & Yesavage, 1986); the Activities Specific Balance Confidence Scale was dichotomised at an average of 50 per cent confidence, following Kressig *et al.* 2001; activity level, as measured by the number of trips outside the home per week, was dichotomised at the median, to divide the sample into a low activity group and a high activity group.

5.3 Aim One

5.3.1 Hypothesis 1

People who acknowledge being afraid of falling will report elevated scores in measures of a) anxiety, b) worry, c) depression, and lower scores in measures of d) falls confidence, e) activity and f) physical mobility.

Independent tests were performed with the dichotomous variable "Are you afraid of falling?" as the grouping variable in order to test for significant differences between the mean scores of the two groups: those who acknowledged a fear of falling and those who did not. This variable divided the sample into groups with equal numbers. Mean differences, t values and p values are reported in table 6.

Table 6 Independent t -tests of Afraid versus not afraid (1-tailed).

Measure	Afraid	N	Mean	SD	t	df	p
Anxiety	Not afraid	15	16.00	9.94	0.700	28	.245
	Afraid	15	13.60	8.79			
Worry	Not afraid	15	38.13	17.86	-1.250	28	.111
	Afraid	15	45.33	13.37			
Depression	Not afraid	15	5.93	2.94	0.223	28	.413
	Afraid	15	5.67	3.58			
Falls confidence	Not afraid	15	837	328.28	1.747	28	.045
	Afraid	15	608.27	386.34			
Activity	Not afraid	15	6.73	5.62	0.236	28	.407
	Afraid	15	6.27	5.21			
Physical mobility transformed	Not afraid	15	0.51	0.36	-1.073	28	.146
	Afraid	15	0.66	0.42			

The question "Are you afraid of falling?" did distinguish scores in the measure of falls confidence. Participants who were afraid of falling had significantly lower scores on the measure of falls confidence, ($t = 1.747$, $p = .045$, 1-tailed), therefore part (d) of this hypothesis was supported. However, there were no significant differences between conditions on measures of anxiety, worry, depression, activity or

physical mobility. Parts (a), (b), (c), (e), and (f) of this hypothesis were not supported.

5.3.2 Hypothesis 2:

People with lower scores of confidence (ABC) will be a) more anxious b) more worried, c) more depressed, d) less active, and e) less physically able.

The measure of falls confidence, the Activies Balance Confidence Scale (ABC) was dichotomised at the 50 per cent point (Kressig *et al.* 2001), to allow the sample to be separated into a low confidence ($N = 18$) and a high confidence group ($N = 12$). Independent t tests were then performed in order to test for significant differences between the mean scores of the two groups: those who were low in confidence to move without falling and those who were confident to move without falling. Mean differences, t values and p values are reported in table 7.

Table 7 Independent *t* tests of falls confidence (1-tailed)

	Falls confidence	N	Mean	SD	t	df	p
Anxiety	low confidence	18	15.56	8.35	.538	28	.298
	high confidence	12	13.67	10.86			
Worry	low confidence	18	41.17	13.93	-.235	28	.408
	high confidence	12	42.58	19.19			
Depression	low confidence	18	6.17	3.11	.758	28	.228
	high confidence	12	5.25	3.44			
Activity	low confidence	18	4.89	4.92	-2.148	28	**.020**
	high confidence	12	8.92	5.20			
Physical	low confidence	18	0.68	0.37	1.768	28	**.044**
Ability (trans)	high confidence	12	0.44	0.39			

There were significant differences in mean scores of activity ($t = -2.148$, df = 28, $p = .020$, 1-tailed) and physical mobility ($t = 1.768$, $p = .044$, 1-tailed) between the low falls confidence group and high confidence group. There were no significant differences between groups on measures of anxiety, worry, or depression. Parts (d) and (e) of this hypothesis are supported; parts (a), (b) and (c) are not supported.

5.3.3 Hypothesis 3:

People with higher scores of anxiety will be a) more worried, b) more depressed, c) less confident d) less active, and e) less physically able.

The measure of anxiety, the BAI, was dichotomised at the point in the scale deemed to distinguish people with no anxiety from those with mild, moderate or severe anxiety (Beck *et al.* 1988). Independent *t* tests were then performed in order to detect significant differences between the mean scores of the two groups: those who had no anxiety, and those who did have anxiety. Mean differences, *t* values and *p* values are reported in table 8.

Table 8 Independedent *t* tests of differences between anxious and non-anxious participants (2-tailed)

	Anxiety	N	Mean	S.D.	t	df	p
Worry	Not anxious	10	34.60	10.25	-2.124	26.936	**.043***
	Anxious	20	45.30	17.24			
Depression	Not anxious	10	4.80	3.08	-1.212	28	.236
	Anxious	20	6.30	3.25			
Confidence	Not anxious	10	809.50	436.35	.904	28	.374
	Anxious	20	679.20	337.48			
Activity	Not anxious	10	6.30	6.31	-.143	28	.888
	Anxious	20	6.60	4.96			
Physical Ability (log10)	Not anxious	10	0.46	0.48	-1.156	13.351	.268*
	Anxious	20	0.65	0.33			

* Equal variance not assumed

There was a significant difference in the mean scores of worry (t = -2.124, p = .043, 2-tailed) between the anxious and non-anxious groups. There were no significant differences between groups on measures of depression, confidence, activity or physical mobility. Part a) of this hypothesis is supported; parts b), c), d) and e) are not supported.

5.3.4 Summary

The global fear of falling measure was significantly associated with difference in falls confidence, but not other measures.

The confidence measure was significantly associated with difference in activity and physical mobility in the expected direction, but not other measures.

The presence of anxiety was significantly associated with difference in worry, but not with other measures.

5.4 Aim two

This aim is about exploring the influence of cognitive factors on fear of falling, confidence, and activity restriction. These factors include general beliefs about ageing, beliefs about health which are intended to tap misconceptions about outcomes of physical exercise, and attributions about falls, their avoidability and controllability.

5.4.1 Hypothesis 4

People with elevated scores of a) anxiety, and lower scores of b) confidence and c) activity will report lower morale about ageing.

A correlational matrix was generated to illustrate associations between these variables. Correlations are reported in table 9.

Table 9 Correlations between ageing morale score and experimental variables (1-tailed)

		Anxiety	Falls Confidence	Activity
Ageing Morale	Pearson Correlation	-.362	.068	.118
	Sig. (2-tailed)	**.025**	.361	.267

There was a significant negative correlation between the ageing morale score and anxiety (r = -.362, p = .025, 1-tailed).

This hypothesis was tested by performing independent t tests using dichotomised anxiety, confidence, and activity scores to test for significant differences with the transformed ageing morale score.

Participants in the anxious group did not have significantly lower ageing morale (t =.451, d.f. = 12.96, p = .660, 2-tailed, equal variance not assumed). Participants in the low confidence group did not have significantly lower ageing morale (t = -.300, df = 28, p = .766, 2-tailed). Higher levels of activity were not associated with lower ageing morale score (t = -.887, d.f. = 24.185, p = .384, 2-tailed, equal variances not assumed). This hypothesis is not supported.

5.4.2 Hypothesis 5

People reporting elevated scores on measures of activity and falls confidence will be less likely to hold strong specific health mis-beliefs.

Strength of belief in six different health beliefs was measured. Correlations among beliefs were examined using Pearson's *r*, and are reported in table 10. Two beliefs were highly correlated, "Being out of breath is bad for my health" and "Getting tired is bad for my health" ($r = .669$, $p < .001$, 2-tailed). The other beliefs were not significantly inter-correlated.

Table 10 Pearson's *r* correlations between Health Beliefs, numbered 1-6.

		1	2	3	4	5	6
1. Being out of breath is bad for my health	r	1					
	p	.					
2. Being tired is bad for my health	r	**.669(**)**	1				
	p	<.001	.				
3. I must not wear myself out	r	.205	.351	1			
	p	.278	.058	.			
4. My muscles and ligaments are becoming weaker because of old age	r	.283	.122	.145	1		
	p	.130	.522	.446	.		
5. I must save my strength by doing less	r	.077	.065	.108	.318	1	
	p	.684	.734	.569	.087	.	
6. It will not be possible for me to regain strength in my muscles once I have lost it.	r	.256	-.001	.116	.325	.192	1
	p	.172	.994	.543	.080	.310	.

** Correlation is significant at the 0.01 level (2-tailed).

A correlation matrix was generated to illustrate associations between health beliefs and anxiety, worry, depression, falls confidence and activity. This is displayed in table 11.

Table 11 Pearson's *r* correlations between measures of anxiety, worry, depression, falls confidence, activity, physical ability, attitude to ageing and strength of health beliefs (1-tailed)

		Health Belief 1	Health Belief 2	Health Belief 3	Health Belief 4	Health Belief 5	Health Belief 6
BAI	r	.066	.160	.017	.346	.124	-.113
anxiety	p	.365	.200	.466	.031	.258	.276
PSWQ	r	-.030	-.194	-.218	.170	-.157	.261
worry	p	.438	.153	.124	.185	.204	.082
GDS	r	.235	**.421(*)**	.246	.175	-.200	.103
depression	p	.106	**.011**	.095	.178	.145	.294
ABC	r	-.167	-.026	**-.358(*)**	-.276	-.129	**-.412(*)**
Falls confidence	p	.188	.446	**.026**	.070	.249	**.012**
DIARY	r	-.050	.123	-.015	.062	-.025	**-.428(**)**
activity	p	.397	.260	.469	.374	.446	**.009**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Health beliefs are as numbered in Table 10.

Inspection of the correlational matrix for health beliefs and experimental variables shown in table 11 revealed that depression correlated positively with the belief "getting tired is bad for my health" ($r = .421, p = .011$, 1-tailed). Falls confidence was significantly negatively correlated (in keeping with the hypothesis), with the belief " I must not wear myself out" ($r = -.358, p = .028$, 1-tailed) and with the belief "It will not be possible for me to regain strength in my muscles once I have lost it" ($r = -.428, p = .009$, 1-tailed). This last belief also correlated as expected with activity scores.

Independent tests were performed to determine whether belief in these health misconceptions was related to difference in activity levels or falls confidence. Mean differences, t values and p values between levels of activity are reported in table 12; mean differences, t values and p values between levels of falls confidence are reported in table 13.

Table 12 Mean scores in those with low levels of activity compared with those with higher levels of activity (2-tailed).

	ACTIVE	N	Mean	SD	t	df	p
1. Being out of breath is bad for my health	inactive	15	4.53	1.51	.642	28	.526
	active	15	4.13	1.89			
2. Being tired is bad for my health	inactive	15	4.13	1.73	.335	28	.740
	active	15	3.93	1.53			
3. I must not wear myself out	inactive	15	5.00	1.31	.840	28	.408
	active	15	4.60	1.30			
4. My muscles and ligaments are becoming weaker because of old age	inactive	15	4.60	1.64	-.244	28	.809
	active	15	4.73	1.34			
5. I must save my strength by doing less	inactive	15	4.00	1.60	.107	28	.915
	active	15	3.93	1.79			
6. It will not be possible for me to regain strength in my muscles once I have lost it.	inactive	15	3.80	1.47	2.813	28	**.009**
	active	15	2.40	1.24			

Level of activity was significantly associated with strength of agreement in one of these, the statement "It will not be possible for me to regain strength in my muscles once I have lost it." (t= 2.813, df 28, p = .009, 2-tailed).

Table 13 Mean scores in those with low levels of falls confidence compared with those with higher levels of falls confidence (2-tailed).

	Falls confidence	N	Mean	SD	t	df	p
1. Being out of breath is bad for my health	low confidence	18	4.61	1.685	1.108	28	.277
	high confidence	12	3.92	1.676			
2. Being tired is bad for my health	low confidence	18	4.22	1.437	.783	28	.440
	high confidence	12	3.75	1.865			
3. I must not wear myself out	low confidence	18	5.28	1.074	2.732	28	**.011**
	high confidence	12	4.08	1.311			
4. My muscles and ligaments are becoming weaker because of old age	low confidence	18	4.83	1.505	.755	28	.457
	high confidence	12	4.42	1.443			
5. I must save my strength by doing less	low confidence	18	4.17	1.618	.798	28	.432
	high confidence	12	3.67	1.775			
6. It will not be possible for me to regain strength in my muscles once I have lost it.	low confidence	18	3.61	1.501	2.448	28	**.021**
	high confidence	12	2.33	1.231			

The measure of falls confidence was significantly associated with strength of agreement in two beliefs, "It will not be possible for me to regain strength in my muscles once I have lost it" ($t = 2.448$, df = 28, $p = .021$, 2-tailed) and " I must not wear myself out" ($t = 2.732$, $p = .011$, 2-tailed).

There is partial support for this hypothesis.

5.4.3 Hypothesis 6

Participants who reported not knowing why they fell will be a) more anxious, b) more worried c) less confident, d) less active.

Association between the dichotomous variable "Did you know why you fell?" and the experimental variables were assessed using independent-tests, reported in table 14. Chi-square was used test for association between knowing or not knowing why they had fallen and between reporting the presence or absence of a fear of falling.

Table 14 Independedent *t* tests of mean differences between people who knew why they had fallen and those who did not (1-tailed).

	WHYFELL	N	Mean	SD	t	df	p
Anxiety	did not know why fell	14	17.9286	9.96505	1.787	28	.085
	knew why fell	16	12.06	8.003			
Worry	did not know why fell	14	41.86	18.977	.038	22.977	.970*
	knew why fell	16	41.62	13.361			
Depression	did not know why fell	14	6.14	3.416	.539	28	.594
	knew why fell	16	5.50	3.12			
Falls confidence	did not know why fell	14	723.07	384.463	.006	28	.995
	knew why fell	16	722.25	371.418			
Activity	did not know why fell	14	7.00	5.505	.474	28	.639
	knew why fell	16	6.06	5.323			

There was a significant difference between groups in levels of anxiety in the expected direction ($t = 1.787$, $p = .043$, one-tailed). There were no significant differences between the groups on measures of worry, confidence or activity level.

There was no effect of knowing why they had fallen on the likelihood that people would report fear of falling ($\chi^2 = 0$, df = 1, $p = 1$).

Part (a) of this hypothesis is supported. Parts (b), (c) and (d) are not supported.

5.4.4 Hypothesis 7

Participants who reported that their falls were unavoidable will be a) more anxious, b) more worried c) less confident, d) less active.

Association between the dichotomous variable "Could you have avoided falling?" and the experimental variables were assessed using independent t-tests. Means, *t* values and *p* values are reported in table 15.

Table 15 Independedent *t* tests of mean differences between people who reported their falls as unavoidable and those who did not (2-tailed).

	AVOIDABLE	N	Mean	Std. Deviation	t	df	p
BAI	fall unavoidable	21	14.9524	9.35134	.135	28	.894
Anxiety	fall avoidable	9	14.4444	9.73539			
PSWQ	fall unavoidable	21	40.1429	15.99152	-.831	28	.413
worry	fall avoidable	9	45.4444	16.07880			
GDS	fall unavoidable	21	5.6667	3.36650	-.341	28	.736
depression	fall avoidable	9	6.1111	3.01846			
ABC falls	fall unavoidable	21	744.7143	355.04326	.491	28	.627
confidence	fall avoidable	9	671.1111	423.61375			
DIARY	fall unavoidable	21	6.4286	5.14365	-.110	28	.913
activity	fall avoidable	9	6.6667	6.08276			

There were no significant differences between the group whose falls were avoidable versus the group who felt they could have avoided falling on measures of anxiety, worry, confidence or activity level.

Chi-square was used test for association between the dichotomous variables 'knowing why (they) had fallen', presence or absence of a fear of falling, and falls being 'unavoidable'. 46 per cent ($N = 14$) of the sample had reported that they did not know why they had fallen, or what may have caused them to fall. 70 per cent ($N = 21$) had reported that the falls that they had were unavoidable. 50 per cent ($N = 15$) had reported a fear of falling. There was no relationship between reporting a fear of falling and reporting that falls were unavoidable ($\chi^2 = .159$, df = 1, $p = .690$), or between knowing why you fell and reporting that the fall was unavoidable ($\chi^2 = 3.087$, df = 1, $p = .79$). All parts of this hypothesis remained unsupported.

5.4.5 Summary

Lowered ageing morale was not associated with difference in anxiety confidence or activity.

Level of activity predicted strength of agreement in one of these, the statement "It will not be possible for me to regain strength in my muscles once I have lost it."

Falls confidence was significantly associated with strength of agreement in two beliefs, "It will not be possible for me to regain strength in my muscles once I have lost it" and " I must not wear myself out" .

Not knowing why you had fallen did predict anxiety, but not worry confidence, activity, or being afraid of falling

The fall being perceived as unavoidable did not predict anxiety worry, confidence or activity, or being afraid of falling

5.5 Aim three

5.5.1 Hypothesis 8

Participants who report (a) less anxiety, (b) higher falls confidence, and (c) higher levels of activity will use problem-focused styles of coping

Independent t tests were performed to test this hypothesis, using dichotomised anxiety, falls confidence and activity scores to test for differences in coping style usage in these groups. Mean differences, t and p values are reported in table 16.

Table 16 Independedent *t* tests of mean differences in use of problem-focused coping between anxious and non anxious, low falls confidence and high falls confidence, and low and high activity participants(1-tailed).

		N	Mean	SD	t	d.f.	p
Problem focused coping	not anxious	10	57.00	10.14	1.869	28	**.036**
	anxious	20	49.80	9.85			
Problem focused coping	low confidence	18	52.78	9.45	.368	28	.358
	high confidence	12	51.338	11.99			
Problem focused coping	inactive	15	50.40	9.51	-.949	28	.176
	active	15	54.00	11.19			

There was a significant difference in the amount of problem focused coping used by anxious and non anxious fallers in the predicted direction (t = 1.869, d.f. = 28, p = .036, 1-tailed). Non-anxious fallers used problem-focused strategies to a greater extent than did anxious fallers.

There was no significant difference in the use of problem-focused coping between more and less confident participants, or between active and less active participants.

Part (a) of this hypothesis is supported, parts (b) and (c) are not supported.

As the aim of this study was not only to test the hypothesis that more active and more confident fallers would use problem focused strategies, but to explore which individual coping strategies they used, a correlational matrix was generated using

Pearson's *r* to illustrate associations between coping styles and the experimental variables. *r* and *p* values are reported in table 17

Table 17 Pearson's r Correlations between coping styles, anxiety, falls confidence and activity (1-tailed)

Coping style		Anxiety	Falls confidence	Activity
Active	r	**-.398(*)**	-.211	-.158
	p	**.029**	.264	.406
Planning	r	**-.400(*)**	-.238	-.217
	p	**.029**	.205	.249
Seeking Instrumental	r	-.194	-.150	.104
Support	p	.305	.430	.586
Seeking Emotional	r	-.248	-.168	.043
Support	p	.186	.375	.822
Suppression of	r	-.131	-.069	.129
competing activities	p	.491	.718	.498
Religion	r	-.045	-.187	-.155
	p	.814	.323	.413
Growth	r	-.182	-.154	-.145
	p	.337	.417	.446
Restraint	r	**-.403(*)**	.199	.061
	p	**.027**	.293	.749
Acceptance	r	.027	**-.407(*)**	-.322
	p	.885	**.026**	.083
Focus on and venting	r	-.303	.015	.080
emotions	p	.104	.938	.673
Denial	r	-.078	-.175	-.101
	p	.684	.354	.594
Mental	r	-.127	-.240	-.258
Disengagement	p	.503	.201	.169
Behavioural	r	.138	**.421(*)**	**.568(**)**
Disengagement.	p	.466	**.021**	**.001**
Problem focus	r	**-.393(*)**	-.119	-.009
coping	p	**.032**	.531	.961
Emotion focus	r	-.205	-.332	-.184
coping	p	.278	.073	.330

* Correlation is significant at the 0.05 level (1-tailed).
** Correlation is significant at the 0.01 level (1-tailed).

There were significant negative correlations between anxiety and the subscales 'active', 'planning', and 'restraint' coping. Anxiety also correlated significantly with the summed scale 'problem-focused' coping in the expected direction.

There was a significant negative correlation between falls confidence scores and the coping scale 'Acceptance', and a significant positive correlation between falls confidence scores and the coping scale 'Behavioural Disengagement'.

There was a significant negative correlation between activity scores and behavioural disengagement, suggesting that although more active people were not using problem focused coping, less active people were disengaging behaviourally.

6 Discussion

6.1 The sample

6.1.1 Gender

97 people were given information about the study and asked if they would consider taking part. Of these, two thirds were women, and one third were male. Interestingly, of those that agreed to participate, the ratio is almost 1:1 in that 53.3 per cent were men and 46.7 per cent were woman. Women were five times more likely to refuse to participate than the men. As no additional information was gathered about people who had refused, it is impossible to speculate about the reasons for this imbalance. However, some studies of willingness to participate in treatment research have also reported that men are more likely to participate than women (Brown & Topcu. 2003; Brown, Fouad, *et al.* 2000).

In comparison, population data from the 2001 census of the City of Edinburgh indicates that the gender ratio in this age range is 1:1.56; 61 percent of the population over 65 are female, 39 percent are male. These ratios are considerably different to those obtained in the final sample; the gender distributions of included and excluded individuals were not equivalent. In comparison with census data, the gender ratio in the group of participants approached to take part in the research was consistent with the general population. There seems to have been a response bias towards taking part in the research for men.

Advantages of this are that the impact of gender on variables within this sample could be easily examined. Many studies using natural samples of older adults contain many more women than men, reflecting the feminisation of ageing. There is then the difficulty of generalising the results to men.

6.1.2 Age balance

The sample was distributed across the age range obtained. Men tended to be slightly older than women, but this difference was not significant

6.1.3 Anxiety, worry and depression in the sample

This study established the presence of symptoms of anxiety, worry, and depression in this sample of older people who had fallen. By the least stringent criterion, 66.7 percent of the sample reported the presence of mild to moderate anxiety, and 33 per cent were experiencing symptoms consistent with moderate to severe anxiety. While this seems to be a high prevalence compared with population studies such as Regier *et al.* (1988) which report a 5.5 per cent one month prevalence, it should be borne in mind that symptomatic self reports can result in higher prevalence, as they may reflect sub-clinical anxiety, and are subject to greater interference from similar symptoms that have other causes, for example, hands may be shaky due to the presence of Parkinson's disease rather than anxiety alone.

The incidence of depressive symptoms in the sample is cause for concern, as very few participants were being treated for depression. 26 per cent had a mention of past depression in their medical notes. Over 50 per cent of the sample scored in the range considered to indicate depressive disorder (Sheikh & Yesavage, 1986) using the GDS, a measure well validated in geriatric samples. For broad comparison, Kressig *et al.* (2001) reported that 25.1 per cent of their sample of fallers, with comparable age and frailty, were depressed. This finding of elevated levels of depression among fallers is consistent with other studies (Granek *et al.* 1987).

In terms of worry, the majority of scores do not fall in a range considered clinically indicative of generalized anxiety. This may reflect genuinely representative levels of worry in the sample, on the other hand, people who were more prone to anxiety and worry may have chosen not to participate. Alternatively, clinicians may not have put them forward for inclusion on these grounds. Finally, the sample was drawn from a

population receiving treatment and rehabilitation for falls; this treatment may have alleviated pre-existing anxiety or worry.

6.2 Summary of findings: Hypotheses from aim one

Hypothesis One: People who acknowledge being afraid of falling will report elevated scores in measures of a) anxiety, b) worry, c) depression, and lower scores in measures of d) falls confidence, e) activity and f) physical mobility.

Hypothesis Two: People with lower scores of confidence (ABC) will be a) more anxious b) more worried, c) more depressed, d) less active, and e) less physically able.

Hypothesis Three: People with lower scores of anxiety will be a) more worried, b) more depressed, c) less confident d) less active, and e) less physically able.

These three hypotheses aimed to explore the different conceptualisations of the falls syndrome by testing the predictive use of three different dichotomies on outcome measures of anxiety, worry, depression, falls confidence, activity level and physical ability. The first of these dichotomies was obtained by asking participants if they were afraid of falling. This question predicted differences in falls confidence, but surprisingly did not distinguish significant differences in anxiety or worry. Although differences in mean scores were not significant, it was interesting to observe that the mean anxiety score for the 'afraid' group was in fact lower than that for the 'not afraid' group. However, mean worry scores were higher in the afraid group than in the not afraid group. This raises the possibility that acknowledgement of fear of falling in this sample may be related to a tendency to worry rather than to experience anxiety. This is in keeping with research findings that support the view that this question expresses a generalized fear rather than specific fear of falling (Lawrence *et al.* 1998). It would be interesting to further explore the role of worry in fear of falling in a longitudinal prospective study.

The results of the first hypothesis suggest that using the simple question "Are you afraid of falling?" is not an adequate substitute for measuring anxiety in fallers. Nor that an anxiety measure alone is enough to predict how confident someone may be about moving safely without falling

In keeping with previous findings, (Tinetti, *et al.* 1994) the falls confidence measure was significantly associated with difference in activity and physical mobility in the expected direction, but unexpectedly did not predict difference in anxiety, worry or depression.

The presence of anxiety was significantly associated with difference in worry, but not with other measures. This finding was unexpected, as previous studies have demonstrated links between presence of anxiety and lowered falls confidence. (Downtown & Andrews, 1990) This is of interest given the prevalence of anxiety in the sample.

In conclusion, there may be validity in using these different ways of measuring the phenomenon of fear of falling, or falls syndrome in tandem, but none are sufficient alone.

6.3 Summary of findings: Hypotheses from aim two

Hypothesis 4. People with elevated scores of a) anxiety, and lower scores of b) confidence and c) activity will report lower morale about ageing.

Hypothesis 5. People reporting elevated scores on measures of activity and falls confidence will be less likely to hold strong specific health misbeliefs.

Hypothesis 6. Participants who reported not knowing why they fell will be a) more anxious, b) more worried c) less confident, d) less active.

Hypothesis 7. Participants who reported that their falls were unavoidable will be a) more anxious, b) more worried c) less confident, d) less active.

6.3.1 Attitude to ageing

Hypothesis 4, the hypothesis that ageing morale would be associated with significant differences in anxiety falls confidence and activity, was not supported. It was noted that ageing morale correlated negatively with anxiety and with depression.

Previous studies have suggested that ageing morale might have a direct effect on physical health, as evidenced by data from longitudinal studies (Idler & Kasl, 1991). This study does not provide evidence that a general measure of ageing morale is linked to specific fall-related confidence, or to the amount a person is able to get out of their house. However, it should be borne in mind that the sample had a very low ageing morale score. Although there is no recommended cut-off that differentiates high morale from low morale, 66.7 per cent of the sample scored zero or one on the scale. The scores were therefore significantly skewed.

6.3.2 Health beliefs

Hypothesis five investigated differences in levels of activity and falls confidence related to strength of belief in six different health beliefs. This hypothesis was somewhat exploratory in nature: the belief statements were developed for the study and have not been tested on any other sample. They consisted of items that the physiotherapists with long experience of working with elderly fallers had identified as common misconceptions.

The first two beliefs, "Being tired is bad for my health" and "Being out of breath is bad for my health" were highly correlated, indicating that they may have an underlying concept in common. As has been discussed in the introduction, tiredness and fatigue during exercise become more marked in later life, but may also be perceived as sinister signs of underlying serious illness. The unpleasantness of being excessively breathless or fatigued may be enough to motivate people away from strenuous activity, but it is possible that they would be additionally motivated if they believed that they might do themselves further harm by experiencing breathlessness. Similar cognitions have been reported for people with angina, who may believe that angina pain represents actual damage to their heart muscle. However, although a majority of the sample agreed with these statements, neither appeared to be linked directly to level of falls confidence or activity. This may be because the sample have either a low level of activity, and manage to avoid exertion, or because their fitness level is adequate for the usual demands made on it. In this case, an effect of beliefs such as these may not be seen until individuals are required to increase their level of exertion, for example in a rehabilitation setting. In this case, it would be interesting to explore whether holding these beliefs would mitigate against the uptake of home exercise programs.

The third belief, "I must not wear myself out" was the most strongly held belief, and was agreed by the majority of the sample. It was intended that this statement tap a misconception about being able to 'save one's strength by doing less', the fifth belief, but these did not correlate with one another. There was a significant difference in strength of the belief "I must not wear myself out" between people who had high

falls confidence or low falls confidence: Although both groups believed it, the low confidence group believed it more strongly. There was no relationship between the belief "I must save my strength by doing less" and confidence or activity level.

The sixth belief was "It will not be possible for me to regain strength in my muscles once I have lost it". This statement implies an outlook of inevitable uncontrollable decline, which might predict a certain amount of hopelessness and lack of motivation to attempt to regain lost strength. Agreement with the sixth belief was less common than disagreement in the sample as a whole, however agreement with this belief was significantly associated with both lower falls confidence and lower activity levels. It is interesting that this belief remains held by patients undergoing physiotherapy, and for whom the main message is that strength and balance skill can be considerably improved if not regained. It would be interesting to see whether this belief changes over the course of rehabilitation; it is possible that the larger number of participants disagreeing with this belief than agreeing with it reflects either their length of attendance or successful rehabilitative experiences.

6.3.3 Appraisals of falls and fear of falling

Although all of the sample had had one or more fall and were attending hospital for management of fall-related risk factors, half said they were not afraid of falling. While it would be too simplistic to predict that more people would have acknowledged fear of further falls just because they had had a fall, there is a question about why people were afraid or not afraid of falling. Hypotheses 6 and 7 suggested that people who felt their falls were unavoidable, or of unknown cause might be more likely to acknowledge a fear of falling than those who did not. However, knowing why they had fallen or perceiving the fall as avoidable did not significantly affect the likelihood that participants would acknowledge a fear of falling.

In support of part of hypothesis 6, not knowing why you had fallen did predict anxiety: People who did not know why they had fallen rated themselves as significantly more anxious than people who did know why they had fallen. However, this knowledge did not significantly predict levels of worry, falls confidence, or

activity levels, as would be suggested following models of health behaviour such as protection motivation theory (Rogers 1983). In fact inspection of the insignificant mean differences suggested that people who did not know why they had fallen were more confident than those who did.

No part of hypothesis seven was supported: The fall being perceived as unavoidable did not predict anxiety, worry, falls confidence or activity level.

6.4 Summary of findings: Coping and falls

Hypothesis 8. Participants who report (a) less anxiety, (b) higher falls confidence, and (c) higher levels of activity will use problem-focused styles of coping

This hypothesis was supported by the finding that non-anxious fallers used problem focused strategies to a significantly greater extent than did anxious fallers. This finding is consistent with the report by Coolidge *et al.* (2000) on coping in anxious and non-anxious older adults, and provides support to findings that have observed lower levels of distress in people endorsing problem-focused strategies. (Keefe *et al.*1987).

However there was no significant difference in the use of problem-focused coping between more and less confident participants, or between active and less active participants. This suggests that there may be no broad association between individuals' approaches to situations and outcome and confidence in fallers. However, there were some design flaws; the coping measure was used in the dispositional form, that is, participants were asked to consider how they coped generally with stressful or difficult situations, rather than being asked about a specific situation, for example falls. However, in a study of the association between situational and dispositional coping, Carver *et al.* (1989) report that the two approaches have low to moderate correlations. This suggests that although there are similarities in response style, some information may be lost about coping in a specific situation when the dispositional form is used. During administration, it was noted that some participants were answering with reference to their current fall-related stress, despite being asked to consider their response to stress generally, thus it is not clear to what extent this study has examined situational coping in fallers.

There were significant negative correlations between anxiety and the subscales 'active', 'planning', and 'restraint' coping. Anxiety also correlated significantly with the summed scale 'problem-focused' coping in the expected direction. Active coping involves taking steps to cope with a stressor, planning involves thinking about how

to cope, and restraint involves holding back until the right moment. In terms of response to the threat of falls, it is not clear which present adaptive strategies for continued physical health, as opposed to the maintenance of good emotional health. The strategy of restraint, although here described as a 'problem-focused' strategy, is also passive in nature. Taking up passive coping could be detrimental for levels of physical mobility that rely on continued activity.

There was a significant negative correlation between falls confidence scores and the coping scale 'Acceptance', and a significant positive correlation between falls confidence scores and the coping scale 'Behavioural Disengagement'. Acceptance is another strategy that can either be viewed as a positive realistic outlook on a problem, the opposite of denial, but use of premature acceptance might indicate 'giving up' trying to solve a problem prematurely. It is therefore interesting that people with low confidence appeared to be endorsing this strategy more than those with higher confidence.

Perhaps a more useful way to look at coping in fallers would be to look at patterns of coping, rather than at summed scores in broad categories. The COPE scale allows this, with its distinct subscales. However, this would require a much larger sample than was obtained in the current study. Assessment of coping might allow clinicians to appreciate patients' strengths and priorities; these may not be same as those held for the patient by their therapists. For example, a priority of hospital staff might be patient safety. This might mean that the patient is advised not to move unless accompanied by another person. However, in practise, complying with this may mean that they are unable to undertake valued activities.

Another useful dimension would be to consider coping from the perspective of the self-system, and the processes of assimilation and accommodation by which individuals adapt to change (Whitbourne, 1996b). As has been suggested in the introduction, the multiple threshold model of threat to physical identity (Whitbourne, 1996b) could be a useful way to conceive attempts to cope with events surrounding falls, useful both clinically and for aiding further research into the meaning of falls for older adults.

6.5 Discussion of Methodological limitations

6.5.1 Design

There are a number of methodological limitations of this study. Firstly, the failure to obtain a larger sample size resulted in loss of power. Data collection occurred over more sessions with each individual than expected, due to fatigability of some participants and the practical need to work around the timetable of each day hospital. However it was fluctuations in referral rates and the numbers of people meeting inclusion criteria that primarily affected the numbers of participants. The failure to achieve adequate power must be borne in mind when considering the significance of the results obtained, particularly where non-significant results occur.

Data collection was extended due to the number of measures gathered. Although this did not appear to have a significant impact on the numbers of people who could be seen, it may have influenced some participants' decisions not to be part of the study. Over 50 per cent of people approached declined to participate, and as the majority of these were women, it appeared that there was a gender-linked bias. The reasons for this are not known; however it is possible that those who declined felt themselves to be more fatigued by the demands of their physiotherapy programme. Although an effort was made to enhance the visibility of the information, consent forms and measures, approximately half the sample required the questionnaires to be either read for them, written for them, or both. It is possible that some people may not have wished to put themselves in that situation, due to dissatisfaction with their handwriting.

A more fundamental design issue is the use of cross-sectional data to explore variables that are likely to interact in a complex transactional way over time. Associations between variables are found retrospectively, therefore no assumptions can be made about whether they are causes or effects. Similarly, the measures of anxiety, depression and falls confidence relate to current emotional state, whereas falls information and coping style are measures of what happened in the past. Prospective studies with control groups for comparison are required to investigate causal, mediating or moderating effects of variables. Cross-sectional studies such as

these do have use in generating hypotheses, and in observing relationships between variables.

6.5.2 Measures

The PSWQ was found to be one of the most problematic scales for participants to complete, particularly participants with mild cognitive problems. The scale items are a series of statements such as "I worry all the time"; the task is to consider 'how typical of you' each statement is on a five point scale, from 'not at all typical', to 'very typical'. Problems were more likely to occur on the reverse items which contained a negative, for example, 'If I do not have time to do everything, I do not worry about it', as people found it hard to know which end of the scale reflected their true answer. It is possible that considering a double negative as an answer taxed attentional capacities. During face-to-face administration, prompts were used, such as "Is this statement typical of you?" It is possible therefore that this manner of administration has resulted in a difference in results compared to other studies where the scale has been self-administered. I would maintain however, that using such prompts has resulted in a more accurate representation of peoples' worries. In their investigation of the psychometric properties of the PSWQ, Beck, Stanley & Zebb (1995) reported a two-factor structure, whereas previous studies on a younger population have reported that the PSWQ is uni-dimensional (Brown *et al.* 1992; Meyer *et al.* 1990). Beck *et al.*'s second factor, which they termed 'absence of worry' loaded entirely on the five items which required a reverse; the same items that were difficult for people to complete accurately. Although Beck Stanley and Zebb (1995) suggest that the two factor structure, worry and absence of worry, is in keeping with theories that see negative and positive affect as distinct processes (Watson, Clark, & Tellegen, 1988), it seems possible that this two factor structure may also reflect difficulty that an elderly sample may have with answering those scale items.

The weekly activity diaries were used in order to obtain a measure of what people were actually doing, to compare with physical measures obtained in hospital. However, the diary was problematic to complete for many of the sample, due to

difficulties with vision and fine motor control affecting writing and reading abilities. Although some participants had a partner who helped them complete the diary, others described their week's activities in retrospect to the researcher. Whereas this data remains a useful indication of what someone is actually doing, retrospective diaries run the risk of being affected by memory. Another criticism of a week long diary is that it may not report activities that occur less frequently. Such events may not contribute to a persons overall fitness, but might have significant effects of well-being and mood.

There were some difficulties with the measures of cognitive impairment, the MMSE (Folstein *et al.* 1975) and the AMT (Jitapunkel *et al.* 1991). Firstly, they were not routinely administered, so there was a large amount of missing data, and some inconsistency in which patients had received them and which had not. Both of the measures are designed to be brief screening tools, and do not provide an assessment of cognitive status. Due to their brevity and design, they are much more likely to fail to detect mild or focal cognitive decline than to falsely report the presence of cognitive impairment. They therefore gave a very conservative estimate of cognitive decline in the sample. Subjectively, it seemed that more of the participants showed signs of mild cognitive impairment, as evidenced in some cases by difficulty with manipulating information, poor memory for several stage instructions, and difficulty with abstract concepts. Cognitive changes are linked to increases anxiety, therefore some of the sample may have been anxious for this reason.

6.6 Clinical implications of the current study

This study highlights the presence of anxiety and depressive symptoms in elderly fallers, even in a sample that was receiving professional input and that may have under-represented the most distressed.

There are also implications for treatment and assessment of fallers. The study highlights the prevalence of a discrete range of potentially important misbeliefs about health and the potential gain of activity and exercise. This provides further support for treatment interventions that have a cognitive behavioural approach, such as that developed by Childs & Kneebone, (2002). Differences in coping strategies used by fallers may imply the need for different treatment emphases including education and the tackling of misconceptions, and encouraging behavioural approach strategies, not avoidance.

6.7 Future research

Future research might further explore the impact of health beliefs and coping style on rehabilitation outcomes in a prospective fashion.

Whitbourne's multiple threshold model could be integrated with cognitive behavioural approaches to fear of falling to understand risks and gains to fallers of using accommodative and assimilative coping strategies.

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8 Appendices

8.1 Patient and GP Information

Patient Identification Number for this trial:

CONSENT FORM

Title of Project: **Fear of falling and activity restriction: An exploration of the role of anxiety, coping style and beliefs about ageing.**

Name of Researcher: Caroline Burdon-Cooper
Trainee Clinical Psychologist

Please initial box

1. I confirm that I have read and understand the information sheet dated 22nd December 2002 for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

3. I understand that sections of any of my medical notes may be looked at by responsible individuals from regulatory authorities where it is relevant to my taking part in research. I give permission for these individuals to have access to my records.

4. I agree to take part in the above study.

Name of Patient	Date	Signature
Researcher	Date	Signature

1 for patient; 1 for researcher; 1 to be kept with hospital notes

PATIENT INFORMATION SHEET (22ND December 2002)

Research Project: Fear of falling, activity restriction and anxiety

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully, and to discuss it with friends, relatives and your GP if you wish. Ask us if there is anything that is not clear, or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

Many people who have fallen or who are at risk of falling report that they have lost confidence in their abilities to move around safely, and report that they feel quite anxious and afraid about falling again. Many people cope extremely well with such difficulties, and manage their anxieties very successfully.

We would like to investigate the links between experiences of falling that people have had, anxiety they have felt, and whether they have felt the need to cut back on what they do. We are also interested to know more about how people cope with experiencing falls, or being at risk of falling.

We are inviting people who have been referred to the falls prevention programme at the Medical Day Hospital to take part.

The study will be carried out within the Medical Day Hospital from February to July 2003.

We hope that the information gathered in this project will help us improve the services offered to people who have fallen, or who are at risk of falling.

What will I have to do?

If you decide to take part in the study, we will arrange two appointments of forty minutes each. In these, we will ask you a number of questions about your experiences of falling, and ask you to complete a series of questionnaires. We will also ask you to complete a simple diary to record what sort of activities you do in one week. The appointments will take place at the Medical Day Hospital, and will be arranged for your convenience, so as not to interfere with your treatment programme.

What are the benefits of taking part?

We do not expect that taking part in the research will help you directly, and it will not change the treatment you receive. However, the information we get from this study may help us to treat future patients more effectively.

What happens if I decide to take part?

If you decide to take part, please tick the relevant box on the slip provided, sign the consent form, and return both of these in the envelope provided. You will then be offered two appointments with Caroline Burdon-Cooper, Trainee Clinical Psychologist and lead researcher.

What happens if I decide not to take part?

Taking part in this study is completely voluntary. If you decide to take part you are still free to withdraw at any time without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

What about confidentiality?

Any information about you remains strictly confidential, and is subject to the Data Protection Act. Information gained in the course of research will be anonomised and held separately from general hospital records in a locked filing cabinet. Any

information about you that leaves the hospital will have your name and address removed so that you cannot be recognised from it. When the research results are published, your identity will be completely protected. Your General Practitioner will receive notification that you have elected to take part in this study.

I'm not sure if I want to take part...

If you are not sure about whether to take part in this study, or have further questions, please feel free to talk to the lead researcher, Caroline Burdon-Cooper, to Dr Elizabeth McDonald, Consultant Geriatrician, or to the independent advisor listed below, who is not directly involved in this study.

Local independent advisor: Professor Mick Power
Department of Clinical Psychology
Kennedy Tower
Royal Edinburgh Hospital
Morningside Park
Edinburgh

Telephone number: 0131 537 6279

Many thanks for taking the time for reading through this information. Please feel free to contact me should you have further questions.

Lead researcher: Caroline Burdon-Cooper, Trainee Clinical Psychologist, Department of Clinical Psychology,
Royal Victoria Hospital, Edinburgh.
Telephone number: 0131 537 5147

This research is being conducted in part fulfilment of the Doctorate in Clinical Psychology

GP INFORMATION SHEET (20th December 2002).
Research Project: Fear of falling, activity restriction and anxiety.

Date:

Dear (GP)

Re: (patient details)

(Patient's name) was recently referred to the Falls Prevention Programme at the Royal Victoria Medical Day Hospital/ Eastern General Medical Day Hospital. They are therefore appropriate for inclusion in a research project I am currently undertaking, and I have invited them to participate.

Aims of the study

Many people who have fallen or who are at risk of falling report that they have lost confidence in their abilities to move around safely, and report that they feel quite anxious and afraid about falling again. Many people cope extremely well with such difficulties, and manage their anxieties very successfully. However, the research has suggested that both fear of falling, and activity restriction are likely to increase the risk of future falls.

We would like to investigate the links between experiences of falling that people have had, anxiety they have felt, and whether they have felt the need to cut back on what they do. We are also interested to know more about how people cope with experiencing falls, or being at risk of falling. We also intend to explore the effects of beliefs about health status, locus of control, and negative views of ageing on anxiety and activity restriction.

Research design

The project will be a correlational study. Participation will be entirely voluntary, and will not affect or interfere with treatment being offered. Participants will be given two forty minute appointments to be held at the medical day hospital, during which they will be asked a series of questions and asked to complete a number of questionnaires and an activity diary. These appointments will be with the lead researcher, a trainee clinical psychologist in the final year of training. Participants who are not able to give informed consent will be excluded from the study.

While it is not expected that involvement in the study will directly benefit participants, it is hoped that the findings will contribute to future patient care.

You will be kept informed about whether your patient has decided to take part in the study. If you have any questions or concerns about this patient entering the study, please do not hesitate to contact me on 0131 537 5147. Dr Elizabeth MacDonald, Consultant Geriatrician, is aware of this study and would be happy to be contacted on 0131 537 5023 should you have further questions or concerns.

Yours sincerely,

Caroline Burdon-Cooper under the supervision of Dr Pauline Thomson
Trainee Clinical Psychologist Chartered Clinical Psychologist

Invitation letter

Date:

Dear

Study of fear of falling, activity restriction and anxiety.

You have recently been referred to the falls prevention and management programme at the Royal Victoria Medical Day Hospital. On this basis, I would like to invite you to consider taking part in a research project I am carrying out.

As many people who have fallen or who are at risk of falling feel that they have lost confidence in their abilities to move around safely, we would like to investigate the links between experiences of falling that people have had, anxiety they have felt, and whether they have felt the need to cut back on what they do.

As many people cope extremely well with such difficulties, and manage their anxieties very successfully, we are also interested to know more about how people cope with experiencing falls, or being at risk of falling.

The enclosed information sheet explains more about this project, and what would be involved for you in taking part. I will also be available in the medical day hospital to discuss the project and answer your questions before you decide whether to take part.

I would be very grateful if you would take the time to read this sheet.

If you decide to become involved with the project, please sign the attached consent form and return it with the slip below to the Day Hospital. Your decision will not affect your current or future treatment in any way.

If you have any questions, please do not hesitate to contact me on 0131 537 5147.

Yours sincerely

Caroline Burdon-Cooper under the supervision of Dr Pauline Thomson
Trainee Clinical Psychologist Chartered Clinical Psychologist

.....

Please tick whichever is relevant

I am interested in taking part in this research study.
I enclose the consent form which I have signed. _____

I am not interested in taking part in this research study. _____

Name:_____Date of birth:_____

8.2 Measures

Structured Interview

Age

Gender

Marital

Live alone

No of years alone

Perceived health status (0-100)

Rate health as poor, fair good

Perceived future falls risk (0-100)

Afraid of falling

No of falls

No of hospitalisations due to falls

Length of stay

Broken bones

Get up after fall (worst fall)

Do you know why you fell?

Could you have avoided it?

Could you have changed the outcome by changing the circumstance?

Could you have changed the outcome by doing something differently yourself/changing yourself?

Use walking aids?

Which?

What percent of time?

Can you manage without them at all?

Handrails at home?

Where?

Have you moved to different accommodation due to falls?

WEEKLY ACTIVITY SCHEDULE

Day Date	.../.../...	.../.../...	.../.../...	.../.../...	.../.../...	.../.../...	.../.../...
7-8am							
8-9am							
9-10am							
10-11am							
11-12pm							
12-1pm							
1-2pm							
2-3pm							
3-4pm							
4-5pm							
5-6pm							
6-7pm							
7-8pm							
8pm onwards							

Simply write down what you do in the times marked each day. One or two words are enough to describe what you do. For example, if you were doing housework at 10-11am on Monday morning you would only need to write housework in the space provided. Please remember to bring this sheet with you at your next appointment.

Disagree strongly	**1**
Disagree moderately	**2**
Disagree slightly	**3**
Agree slightly	**4**
Agree moderately	**5**
Agree strongly	**6**

Please choose one of the above numbers to indicate whether you agree or disagree with the statements below.

Being out of breath is bad for my health.	
Getting tired is bad for my health.	
I must not wear myself out.	
My muscles and ligaments are becoming weaker because of old age.	
I must save my strength by doing less.	
It will not be possible for me to regain strength in my muscles once I have lost it.	

Attitude Toward Own Aging Sub-Scale

From the Philadelphia Geriatric Morale Scale (Lawton, 1975)

	Questions	Yes	No
1.	Do things keep getting worse as you get older?		
2.	Do you have as much pep as you had last year?		
3.	Do you feel that as you get older you are less useful?		
4.	As you get older, are things (better/worse) than you thought they would be?	Better	Worse
5.	Are you as happy now as you were when you were younger?		

PSWQ

Enter the number that best describes how typical or characteristic each item is of you, putting the number next to the item.

1	2	3	4	5
Not at all Typical		Somewhat typical		Very typical

___ 1. If I don't have enough time to do everything I don't worry about it.

___ 2. My worries overwhelm me.

___ 3. I don't tend to worry about things.

___ 4. Many situations make me worry.

___ 5. I know I shouldn't worry about things, but I just can't help it.

___ 6. When I am under pressure I worry a lot.

___ 7. I am always worrying about something.

___ 8. I find it easy to dismiss worrisome thoughts.

___ 9. As soon as I finish one task, I start to worry about everything else I have to do.

___ 10. I never worry about anything.

___ 11. When there is nothing more I can do about a concern, I don't worry about it any more.

___ 12. I've been a worrier all my life.

___ 13. I notice that I have been worrying about things.

___ 14. Once I start worrying, I can't stop.

___ 15. I worry all the time.

___ 16. I worry about projects until they are all done.

Reverse-score items 1, 3, 8, 10, and 11, and then sum over 16 items.

LATE LIFE DEPRESSION PROJECT

G. D. SCREENING SCALE (YESAVAGE)
(SHORT FORM)

NAME:	DATE:

Please answer all the following questions by ringing either 'YES' or 'NO'

1. Are you basically satisfied with your life?	YES/NO
2. Have you dropped many of your activities and interests?	YES/NO
3. Do you feel that your life is empty?	YES/NO
4. Do you often get bored?	YES/NO
5. Are you in good spirits most of the time?	YES/NO
6. Are you afraid that something bad is going to happen to you?	YES/NO
7. Do you feel happy most of the time?	YES/NO
8. Do you often feel helpless?	YES/NO
9. Do you prefer to stay at home, rather than going out and doing new things?	YES/NO
10. Do you feel you have more problems with memory than most?	YES/NO
11. Do you think it is wonderful to be alive now?	YES/NO
12. Do you feel pretty worthless the way you are now?	YES/NO
13. Do you feel full of energy?	YES/NO
14. Do you feel that your situation is hopeless?	YES/NO
15. Do you think that most people are better off than you?	YES/NO

Falls Efficacy Scale

(Tinetti et al 1990)

How confident / sure are you that you do each of the following activities without falling? Please score on a scale of 0-10.

Activity	**Not confident at all (0)**	**Fairly confident (5)**	**Completely confident (10)**
Get dressed and undressed			
Prepare a simple meal			
Take a bath or shower			
Get in/out of a chair			
Get in/out of bed			
Answer the door or telephone			
Walk around the inside of your house			
Reach into cabinets or wardrobes			
Light housework			
Simple shopping			

The Activities-Specific Balance Confidence Scale (ABC)

(Powell and Myers, 1995)

How confident / sure are you that you do each of the following activities without losing your balance or becoming unsteady?

Please score on a scale of 0-100, where 0 denotes no confidence, and 100 denotes complete confidence.

	Activity	**Confidence rating, (0-100)**
1.	Reach at eye level	
2.	Walk around the house	
3.	Get in/out of car	
4.	Walk outside to near by car	
5.	Walk across car park	
6.	Sweep the floor	
7.	Go up and down stairs	
8.	Pick up slipper from floor	
9.	Walk in crowded shopping centre	
10.	Go up and down a ramp	
11.	Walk in a crowd/ get bumped	
12.	Use an escalator holding the rail	
13.	Reach on tiptoes	
14.	Stand on chair to reach	
15.	Use an escalator not holding the rail	
16.	Walk on icy pavements	

COPE

Name:.....

Date:..... **Record Number:**.....

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do and feel when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Then respond to each of the following items by choosing one number for each, using the response choices listed just below.

1 = I usually don't do this at all.	2 = I usually do this a little bit.
3 = I usually do this a medium amount.	4 = I usually do this a lot.

Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Please answer every item. There are no 'right' or 'wrong' answers, so choose the most accurate answer for YOU – not what you think 'most people' would say or do. Indicate what YOU usually do when YOU experience a stressful event.

1. I try to grow as a person as a result of the experience. ☐
2. I turn to work or other substitute activities to take my mind off things. ☐
3. I get upset and let my emotions out. ☐
4. I try to get advice from someone about what to do. ☐
5. I concentrate my efforts on doing something about it. ☐
6. I say to myself "this isn't real". ☐
7. I put my trust in God. ☐
8. I laugh about the situation. ☐
9. I admit to myself that I can't deal with it, and give up trying. ☐
10. I restrain myself from doing anything too quickly. ☐

11. I discuss my feelings with someone. ☐
12. I use alcohol or drugs to make myself feel better. ☐
13. I get used to the idea that it happened. ☐
14. I talk to someone to find out more about the situation. ☐
15. I keep myself from getting distracted by other thoughts or activities. ☐
16. I daydream about things other than this. ☐
17. I get upset, and am really aware of it. ☐
18. I seek God's help. ☐
19. I make a plan of action. ☐
20. I make jokes about it. ☐

21. I accept that this has happened and that it can't be changed. ☐
22. I hold off doing anything about it until the situation permits. ☐
23. I try to get emotional support from friends and relatives. ☐
24. I just give up trying to reach my goal. ☐
25. I take additional action to try to get rid of the problem. ☐
26. I try to lose myself for a while by drinking alcohol or taking drugs. ☐
27. I refuse to believe that it has happened. ☐
28. I let my feelings out. ☐
29. I try to see it in a different light, to make it seem more positive. ☐
30. I talk to someone who could do something concrete about the problem. ☐

31. I sleep more than usual. ☐
32. I try to come up with a strategy about what to do. ☐
33. I focus on dealing with this problem and, if necessary, let other things slide a little. ☐
34. I get sympathy and understanding from someone. ☐
35. I drink alcohol or take drugs, in order to think about it less. ☐
36. I kid around about it. ☐
37. I give up the attempt to get what I want. ☐
38. I look for something good in what is happening. ☐
39. I think about how I might best handle the problem. ☐
40. I pretend that it hasn't really happened. ☐

41. I make sure not to make matters worse by acting too soon. ☐
42. I try hard to prevent other things from interfering with my efforts at dealing with this. ☐
43. I go to the cinema or watch television, to think about it less. ☐
44. I accept the reality of the fact that it happened. ☐
45. I ask people who have had similar experiences what they did. ☐
46. I feel a lot of emotional distress and I find myself expressing those feelings a lot. ☐
47. I take direct action to get around the problem. ☐
48. I try to find comfort in my religion. ☐
49. I force myself to wait for the right time to do something. ☐
50. I make fun of the situation. ☐

51. I reduce the amount of effort I'm putting into solving the problem. ☐
52. I talk to someone about how I feel. ☐
53. I use alcohol or drugs to help me get through it. ☐
54. I learn to live with it. ☐
55. I put aside other activities in order to concentrate on this. ☐
56. I think hard about what steps to take. ☐
57. I act as though it hasn't even happened. ☐
58. I do what has to be done, one step at a time. ☐
59. I learn something from the experience. ☐
60. I pray more than usual. ☐

BAI®

ME _____ DATE _____

ow is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by each
ıptom during the PAST WEEK, INCLUDING TODAY, by placing an X in the corresponding space in the column next to each symptom

	NOT AT ALL	MILDLY It did not bother me much.	MODERATELY It was very unpleasant, but I could stand it.	SEVERELY I could barely stand it.
1. Numbness or tingling.				
2. Feeling hot.				
3. Wobbliness in legs.				
4. Unable to relax.				
5. Fear of the worst happening.				
6. Dizzy or lightheaded.				
7. Heart pounding or racing.				
8. Unsteady.				
9. Terrified.				
10. Nervous.				
11. Feelings of choking.				
12. Hands trembling.				
13. Shaky.				
14. Fear of losing control.				
15. Difficulty breathing.				
16. Fear of dying.				
17. Scared.				
18. Indigestion or discomfort in abdomen.				
19. Faint.				
20. Face flushed.				
21. Sweating (not due to heat).				

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